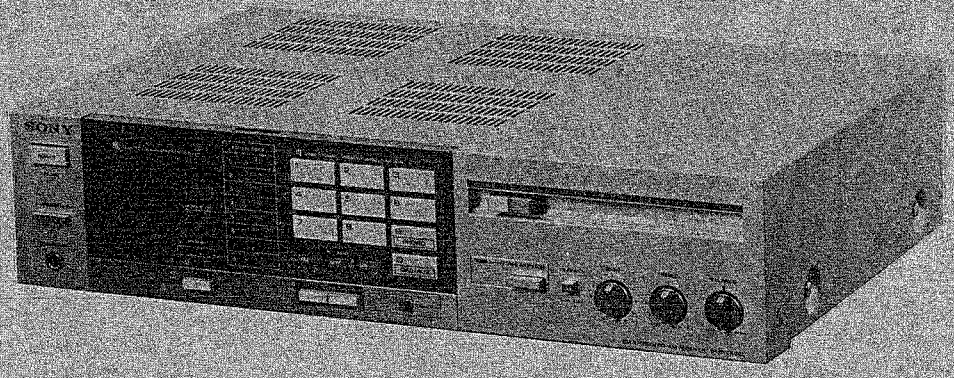
STR-VX20L

AEP Model



FM STEREO/FM-AM RECEIVER

SPECIFICATIONS

Amplifier section

Continuous RMS power output
(Less than 0.03% THD, both channels driven simultaneously)
At 20 Hz - 20 kHz
30 + 30 watts (8 ohms)
According to DIN 45500
30 + 30 watts (8 ohms)

Dynamic headroom 1.4 dB ('78 IHF)

Harmonic distortion Less than 0.03% at rated output

Intermodulation (IM) distortion
(60 Hz : 7 kHz = 4 : 1) Less than 0.03% at rated output

Frequency response PHONO : RIAA equalization curve ±0.5 dB
DAD/AUX, TAPE: 10 Hz - 70 kHz $^{+0}_{-1}$ dB

Residual noise Less than 120 μV (8 ohms, network A)

Damping factor 35 (8 ohms, 1 kHz)

Inputs

	Sensitivity	Impedance	Maximum input capability (1 kHz)	S/N (weighting network, input level)
PHONO	2.5 mV	50 kΩ	150 mV	74 dB 74 dB* (A, 2.5 mV)
DAD/AUX TAPE	150 mV	50 kΩ	—	96 dB 79 dB* (A, 150 mV)

* '78 IHF

Outputs

REC OUT
Voltage 150 mV
Impedance 10 k ohms

SPEAKER A, B
Accepts speakers of 8 to 16 ohms.

HEADPHONES
Accepts low and high impedance headphones.

Tone controls
BASS
±8 dB at 100 Hz
TREBLE
±8 dB at 50 kHz

Loudness (att. 30 dB) +8 dB at 100 Hz
+3 dB at 10 kHz

— Continued on page 2 —

SAFETY-RELATED COMPONENT WARNING!!

COMPONENTS IDENTIFIED BY SHADING AND MARK ⚠ ON THE SCHEMATIC DIAGRAMS, EXPLODED VIEWS AND IN THE PARTS LIST ARE CRITICAL TO SAFE OPERATION. REPLACE THESE COMPONENTS WITH SONY PARTS WHOSE PART NUMBERS APPEAR AS SHOWN IN THIS MANUAL OR IN SUPPLEMENTS PUBLISHED BY SONY.

MICROFILM

SONY®

SERVICE MANUAL

TR-VX20L

FM tuner section

Tuning range 87.5 MHz - 108 MHz
Antenna terminal 75 ohms, unbalanced
Intermediate frequency
10.7 MHz
Sensitivity at 46 dB quieting (40 kHz deviation)
4.5 μV (mono)
45 μV (stereo)
Usable sensitivity 1.7 μV (S/N = 26 dB, 40 kHz deviation)
11.2 dBf, 2 μV (IHF)
Signal-to-noise ratio (40 kHz deviation)
74 dB (mono), 69 dB (stereo)
Harmonic distortion (40 kHz deviation)
0.15% (mono), 0.25% (stereo) at 1 kHz
IM distortion (40 kHz deviation)
0.15% (mono), 0.25% (stereo)
Separation 45 dB at 1 kHz
Frequency response 30 Hz - 15 kHz $^{+0.5}_{-2}$ dB
Selectivity 60 dB at 300 kHz
Capture ratio 1.0 dB
AM suppression ratio
54 dB
Image response ratio
50 dB
IF response ratio 90 dB
Spurious response ratio
70 dB
RF intermodulation 60 dB (IHF)
Auto-tuning threshold
Approx. 45 dBf

MW/LW tuner section

		MW	LW
Tuning range		522 kHz - 1,602 kHz	153 kHz - 344 kHz
Antenna	ferrite-bar antenna	provided	provided
	external antenna terminal	provided	provided
Intermediate frequency		450 kHz	450 kHz
Usable sensitivity	ferrite-bar antenna	300 μV/m (at 1,000 kHz)	500 μV/m (at 230 kHz)
	external antenna	100 μV (at 1,000 kHz)	100 μV (at 230 kHz)
Signal-to-noise ratio		54 dB	54 dB
Harmonic distortion		0.3%	0.3%
Selectivity		35 dB (9 kHz)	35 dB (9 kHz)

General

System Turer section: PLL quartz-locked digital synthesizer system
Preamplifier section: low-noise NF type equalizer amp.
Power amplifier section: quasi-complementary SEPP
Power requirements 220 V ac, 50/60 Hz
Memory back-up power: 3 V dc, two batteries, IEC designation R6 (size AA)
Battery life: approx. 1 year with Sony SUM-3(NS) New Super Batteries
Power consumption 70 watts
AC outlets 2 switched total 100 watts
Dimensions Approx. 430 × 105 × 300 mm (w/h/d) (17 × 4 1/4 × 11 7/8 inches) including projecting parts and controls
Weight Approx. 6.3 kg (13 lbs 15 oz) net
Approx. 7.6 kg (16 lbs 13 oz) in shipping carton

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Handling Precautions for MOS ICs

Generally, the insulation resistance of the oxide layer in MOS IC structures is very high, and the oxide layer is very thin. Because of this, it is possible that the static voltages usually present on clothes and the human body will be enough to generate a potential difference across the insulator, high enough to cause a breakdown of the insulating layer.

The following precautions should be taken while handling these ICs.

(Particular care should be taken under conditions of low humidity.)

Precautions in Replacing MOS ICs

1. Store new ICs by inserting them into a urethane-polyester cushion (which is somewhat conductive), or wrapping it in aluminum foil, so that all the pins are at the same potential.
   (The ICs should be stored in that manner until mounted on the circuit board.)

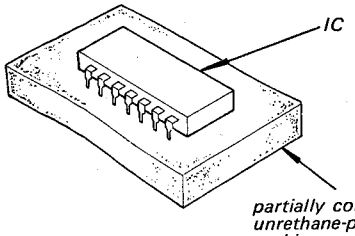


Fig. A

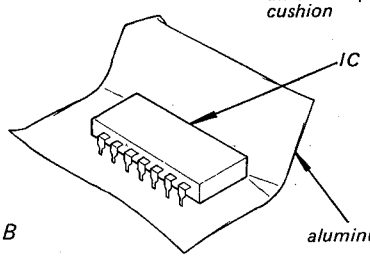


Fig. B

2. Check the soldering iron for possible power-line leakage current. Make sure that there is no leakage path by connecting an ohmmeter to the tip of the soldering iron and the plug as shown in Fig. C. If there is a leakage path, use some other soldering iron.

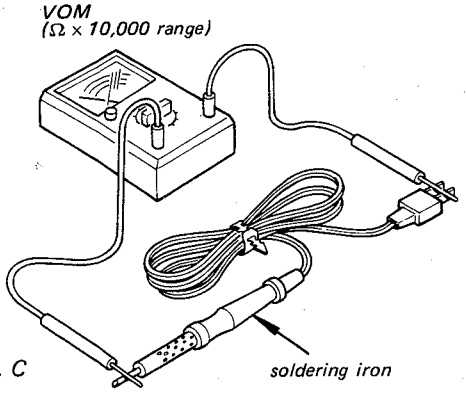


Fig. C

3. Equalize any potential difference between the clothes, the tools in use, the work bench, the set being worked on, and the packaged IC by touching them all in succession with the hands or a conductive wire or tool.
4. The following are effective methods for handling ICs that remove the potential difference across the oxide layer.
   - Use a paper clip modified by soldering in a wire braid insert.

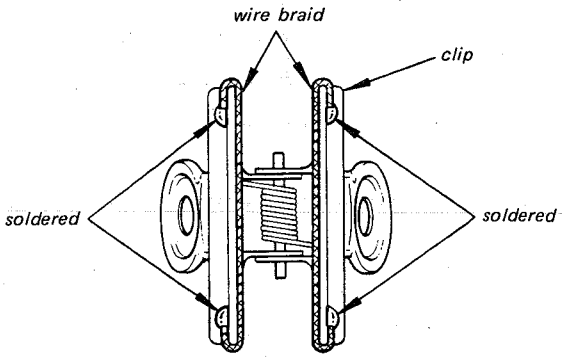


Fig. D Make sure that there is no solder on the inside.

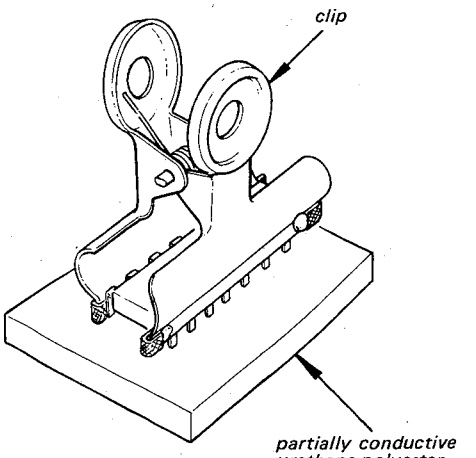


Fig. E

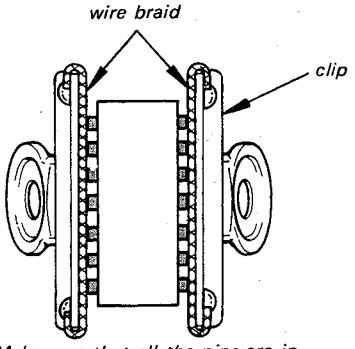


Fig. F Make sure that all the pins are in contact with the wire braid (all the pins will then be at the same potential.).

- Take a short length of fine bare wire and wind it around the IC so that it shorts all the pins of the IC, while it is still in the urethane-polyester cushion or aluminum foil. This ensures that all the pins are at the same potential.

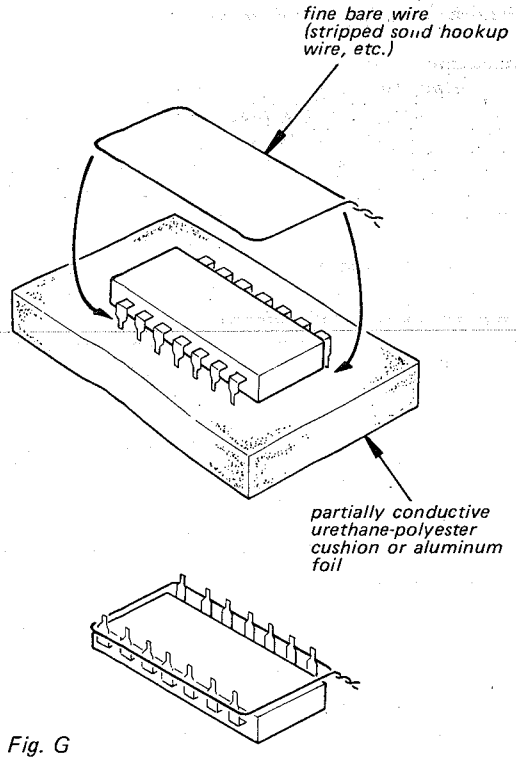


Fig. G

- When it is necessary to handle the IC with the fingers, do not touch any pin, and hold the IC at the ends of its plastic-package case as shown in Fig. H.

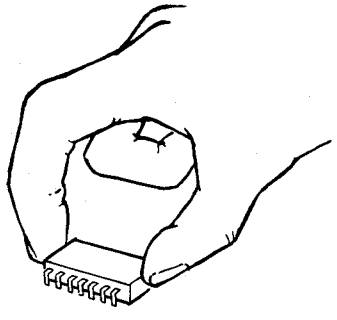


Fig. H

5. Method of Mounting
Insert the IC while holding it with the modified clip, and solder all the pins with the clip still shorting the pins. (Similarly, solder all the pins while the bare shorting wire is still wound around them.). Remove the clip or the bare shorting wire only after all the pins have been soldered.

Precaution while Checking C-MOS ICs

The C-MOS ICs (Complementary MOS) are MOS ICs that have their output sections made up of N-channel and P-channel push-pull stages to increase their speed of operation. If the output terminal of these ICs comes into contact with B+ or B– voltage, then the FET which is ON at that time will either become shorted or open.

This is valid for all the output sections that are connected together by the interconnections. Even the circuits that are physically separated (and not on the same board) can be destroyed simultaneously.

Example:

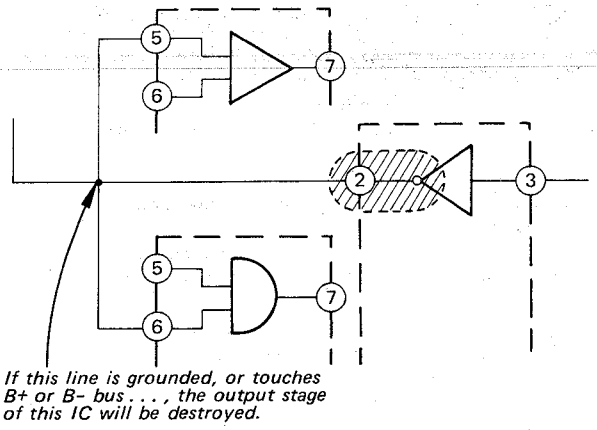


Fig. I

SECTION 1
OUTLINE

FEATURES

The STR-VX20L with its Direct Access System, makes station selection easier than ever. The STR-VX20L also employs the quartz-locked digital synthesizer system in a separate state-of-the-art tuner section and provides medium-high power output for your home audio system from its amplifier section.

Amplifier section

- Tone control stages, which employ an IC, are carefully designed to improve stereo separation and signal-to-noise ratio.
- Protection and power muting circuits are included to avoid annoying thump noise during power switching.

Tuner section

- The quartz-locked digital synthesizer system with a sophisticated Phase Locked Loop (PLL) circuit allows extremely precise tuning of FM and MW/LW stations with an electronic digital readout on the frequency display.

A new IC recently developed by Sony allows the high comparison frequency, thus eliminating the tendency for a low comparison frequency, which had been previously generally employed, to slip into the audio range and degrade the signal-to-noise ratio.

- Four methods of tuning are available:

Direct access tuning; FM or MW/LW stations can be directly tuned in by inputting the station frequency with the DIRECT TUNING buttons.

Automatic tuning: the FM band is scanned automatically until a signal is received.

Manual tuning: MW/LW tuning can be accomplished either by changing the frequency display reading step by step or slowly to monitor the frequency.

Memory preset tuning: a desired pre-memorized station can be instantly received by pressing the PRESET TUNING button.

- The pre-memorized stations are retained in memory by two back-up batteries when the power is turned off. These back-up batteries also allow the last station tuned in to be held in memory.

PRECAUTIONS

On safety

- Operate the unit only on 220 V ac, 50/60 Hz.
- Should any liquid or solid object fall into the cabinet, unplug the unit and have it checked by qualified personnel before operating it any further.
- Unplug the unit from the wall outlet if it is not to be used for an extended period of time. To disconnect the cord, pull it out by grasping the plug. Never pull it out by the cord.

On installation

- Do not install the unit in a location near heat sources such as radiators or air ducts, or in a place subject to direct sunlight, excessive dust, mechanical vibration or shock.
- Good air circulation is essential to prevent internal heat build-up in the unit. Place the unit in the location with adequate air circulation. Do not place the unit on a soft surface, such as a rug that would block the ventilation holes on the bottom.
- Do not place anything on top of the cabinet. The top ventilation holes must be unobstructed for the proper operation of the unit and to prolong the life of its components.
- Do allow more than 15 cm (6 inches) of space behind the unit so that the position of the built-in ferrite-bar antenna can be adjusted.

On operation

- Before making program source connections, be sure to turn the power switch off and unplug the unit.
- Do not attempt to test the protection circuits by blocking the ventilation holes or connecting improper loads.
- When the unit is not used, turn the power off, to conserve energy and to extend the useful life of your unit.

On cleaning

Clean the cabinet, front and rear panels periodically with a soft dry cloth. If the stains are difficult to remove, use a cloth moistened with a mild detergent solution. Do not use solvents such as alcohol, benzine or thinner, since they will damage the finish.

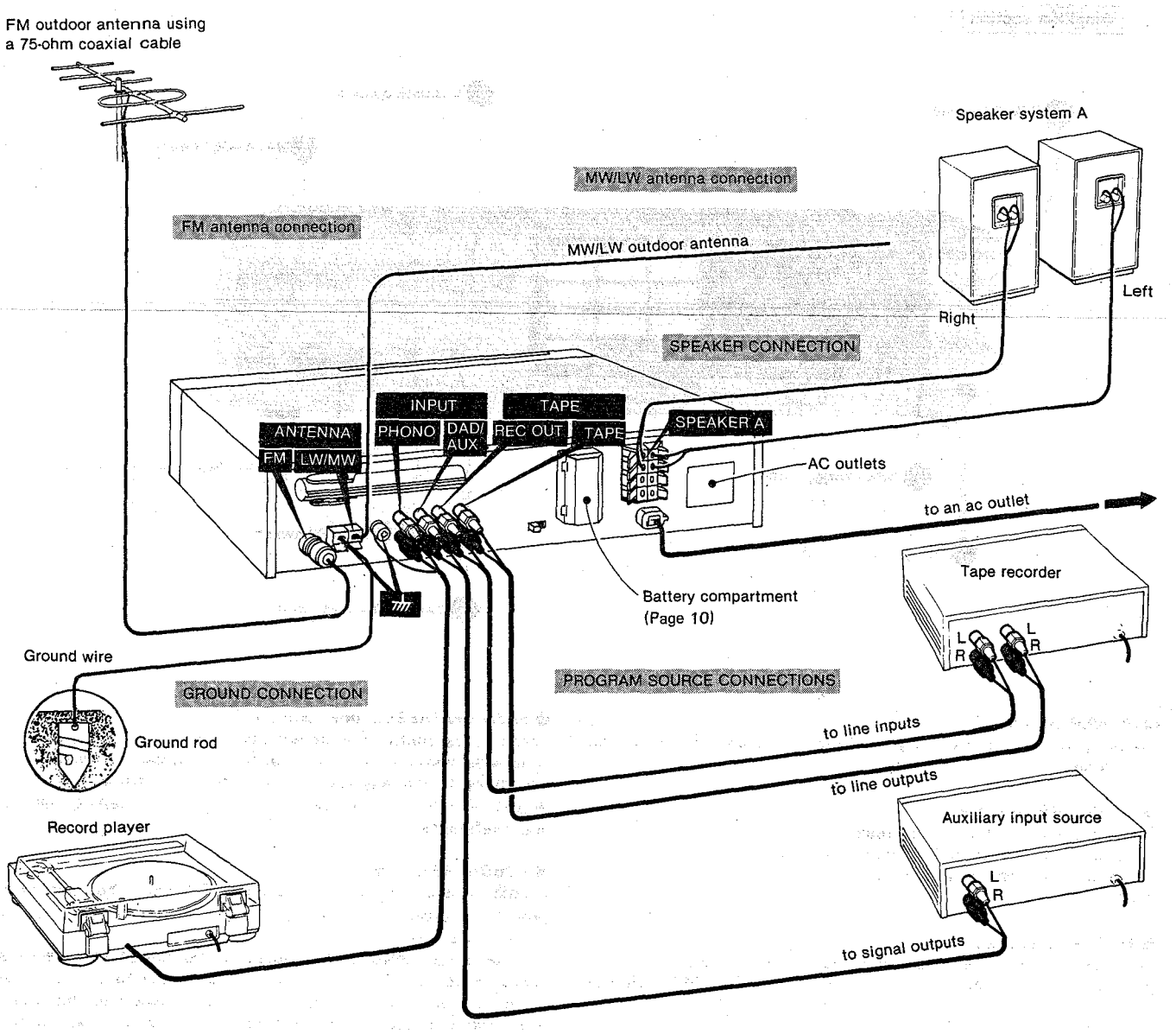
On repacking

Do not throw away the carton and the packing material. It makes an ideal container to transport the unit in. When shipping the unit for repair work or to another location, repack it as illustrated on the carton box.

1-1. OPERATING INSTRUCTIONS

SYSTEM CONNECTIONS

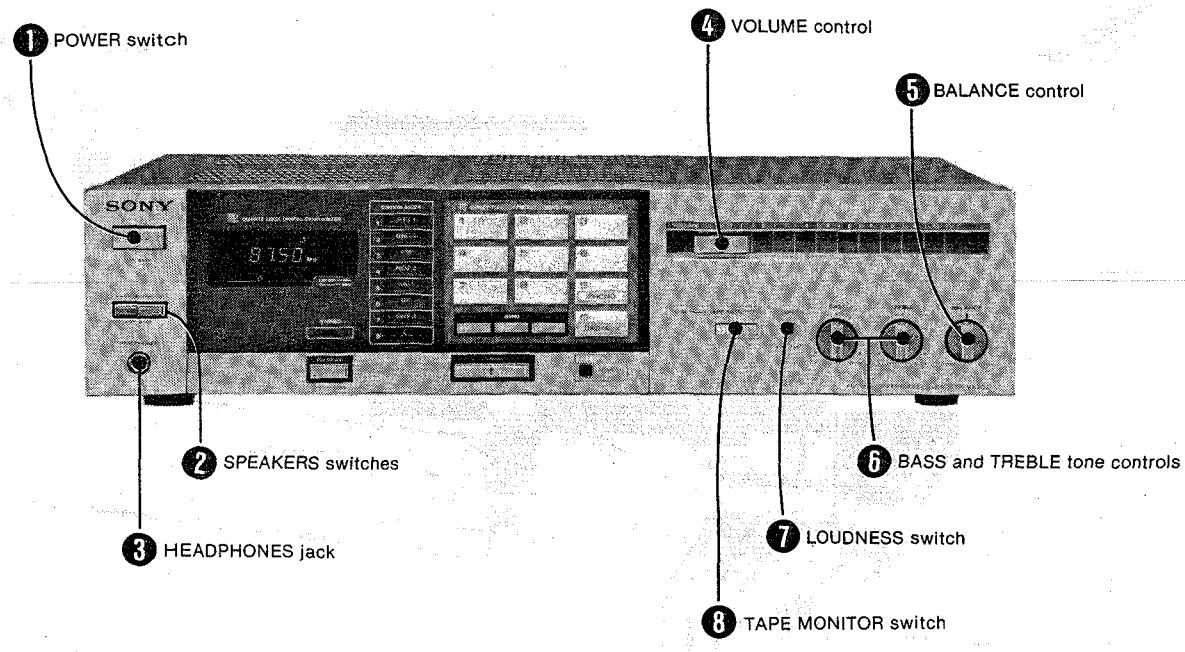
CONNECTION DIAGRAM



LOCATION AND FUNCTION OF CONTROLS

Before plugging in or attempting to operate this receiver,
it is suggested that you familiarize yourself with all its switches and the purpose of each.
Each number in the photo is keyed to the descriptive text.

Amplifier section



❶ POWER switch
Depress to turn on the power. To turn the power off, press the switch again.

❷ SPEAKERS switches
To drive speaker system A, depress the A switch.
To drive speaker system B, depress the B switch.
To drive both speaker systems A and B, depres both A and B switches.

❸ HEADPHONES jack
Accepts any low or high impedance stereo headphones.
For headphone monitoring only, keep the SPEAKERS switches OFF.

❹ VOLUME control
Regulates the overall sound level.
Sliding the lever to the right increases the volume and sliding it to the left decreases the volume. Be sure to lower the volume whenever you turn the receiver on or off or make system connections.

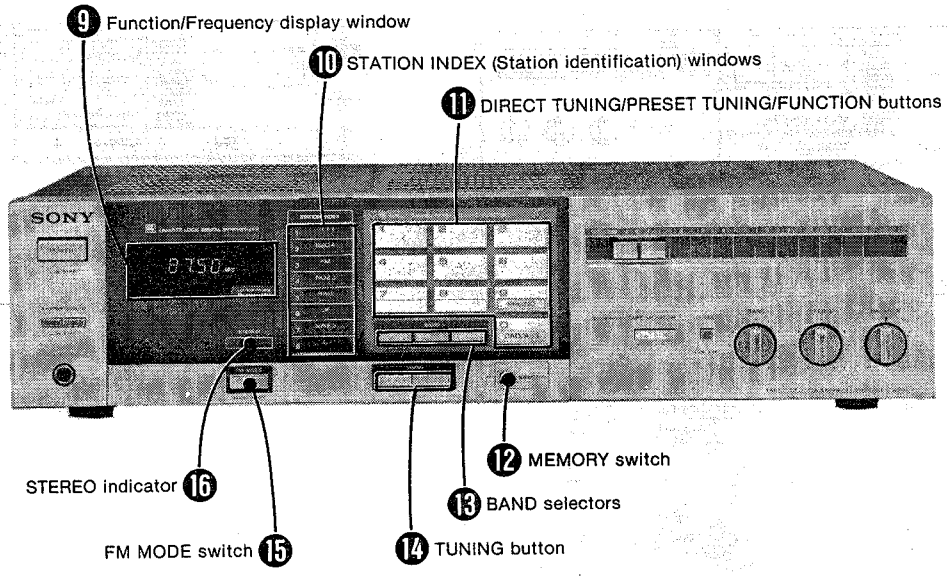
❺ BALANCE control
Governs the amount of sound coming from each paired speaker to get optimum stereo effect. When you turn the BALANCE control to the right, the left channel volume is decreased, and vice versa.

❻ BASS and TREBLE tone controls
These knobs control the prominence of bass and treble response. Clockwise rotation increases response; counterclockwise rotation decreases it. Normally keep these at the "0" position.
Adjust the tone to the acoustic condition of the listening room or to your preference.

❼ LOUDNESS switch
Normally keep the switch released (⊓ OFF). When listening to program sources at a low VOLUME control setting, depress the switch (⊓ ON).
This loudness control compensates for the human ear's decreased response to very low and high frequency sound at low volume levels, and provides an apparently uniform response. The effect of this control gradually decreases as the volume is increased by the VOLUME control.

❽ TAPE MONITOR switch
To listen to a taped program, depress this switch. The indication above this switch will light up, indicating that a playback output from the tape recorder connected to the TAPE jacks can be heard.

Tuner section



⑨ Frequency/function display window

During broadcast reception

Frequency being received

The PRESET TUNING button at which the frequency is memorized.

During reproduction of record source or auxiliary input source.

Program in use

⑩ STATION INDEX (station identification) windows

Station labels (supplied) identifying pre-memorized stations can be placed in these windows.

⑪ DIRECT TUNING/PRESET TUNING/FUNCTION buttons

Press the buttons according to the following desired purposes. The pressed figures will be displayed on the frequency/function display window.

For direct access tuning

(the 1 to 0 buttons serve as DIRECT TUNING buttons)

To tune in the frequency directly, press the BAND selector and the buttons.

For memory preset tuning

(the 1 to 8 buttons serve as PRESET TUNING buttons)

To call up a prememorized station, press the appropriate button.

For reproduction of record and auxiliary sources

(the 9 and 0 buttons serve as FUNCTION buttons)

Press to select between PHONO(9) or DAD/AUX(0).

⑫ MEMORY switch

Press to operate memory circuit. The MEMORY indicator will appear on the band/frequency-display window for a few seconds indicating that the memory circuit is standing by.

⑬ Band selectors

Depress the appropriate selector to select the desired band : FM, MW, or LW.

⑭ TUNING buttons

Press either the "+" or "–" button to change the frequency : Press the "–" button to go to a lower frequency and the "+" button to go to a higher.

During FM reception :

Press to start the automatic frequency scanning (in 0.05 MHz steps).

During MW/LW reception :

Press and keep the button depressed to change the frequency continuously. To change the frequency rapidly, press and release the button immediately.

⑮ FM MODE switch

During FM reception, when a stereo signal of sufficient strength is received, the receiver operates in the stereo mode. (The STEREO indicator will illuminate.)

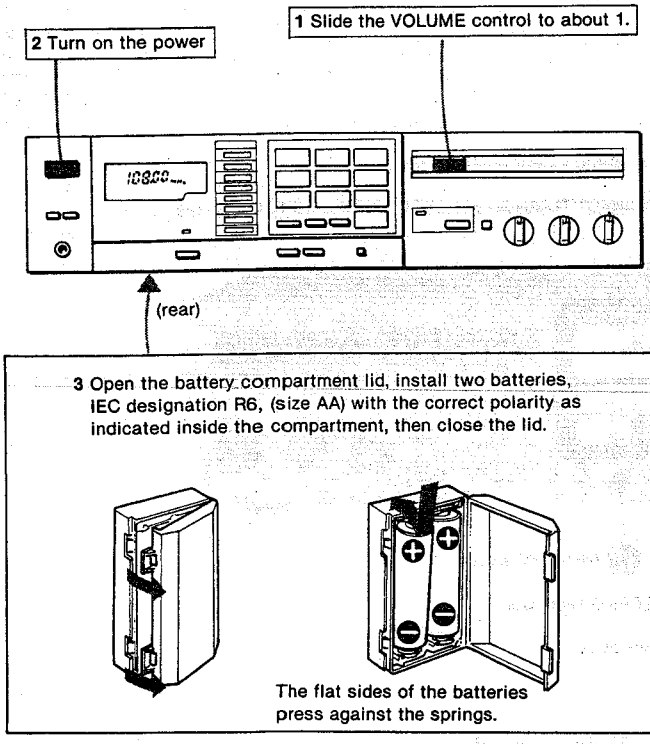
When you want to tune in a very weak FM station, or when an FM program is too noisy, press this switch. (The STEREO indicator illumination will go out.) Press it again to return to the stereo mode. The mode will automatically return to the stereo mode when the frequency is changed.

⑯ STEREO indicator

This indicator will light when an FM stereo program of sufficient signal strength is tuned in with the FM MODE switch engaged.

BATTERY INSTALLATION

To retain the frequencies memorized on the PRESET TUNING buttons while the receiver is turned off, install two batteries in the battery compartment at the rear as follows.

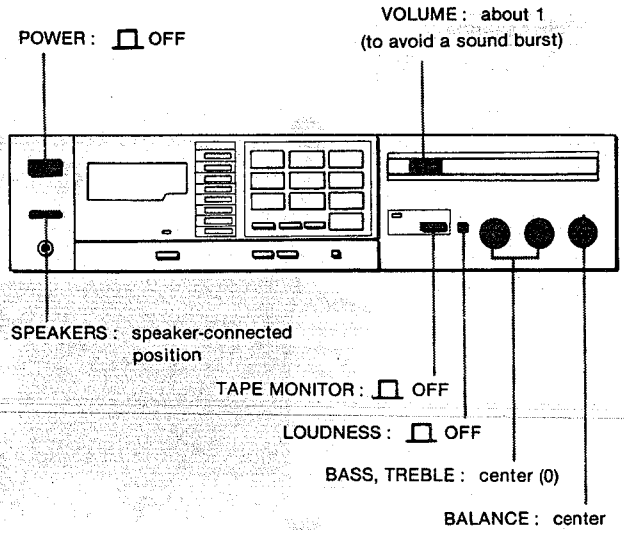

2 Turn on the power
1 Slide the VOLUME control to about 1.
(rear)
3 Open the battery compartment lid, install two batteries, IEC designation R6, (size AA) with the correct polarity as indicated inside the compartment, then close the lid.
The flat sides of the batteries press against the springs.

Battery life
About one year of operation can be expected when using Sony SUM-3(NS) New Super Batteries (or Eveready Heavy Duty Batteries No. 1215). Besure to replace the batteries once a year to avoid damage from leaking batteries.

Note
Be sure to turn on the receiver before installing or replacing the batteries.
If the batteries are installed or replaced with the power turned off, incorrect figures will appear in the function/frequency display and you are not able to turne in the desired station.
In that case :
❶ Leave the unit with power off for 30 minutes.
❷ Turn on the power.
❸ Install the two batteries.
❹ Place the desired frequencies in memory again.

PREPARATION

Before proceeding to any type of operation, set the controls and switches as shown.



BROADCAST RECEPTION

This receiver incorporates the following turning systems which give the listener a choice of 4 ways in which to tune in the desired broadcast.

Direct access tuning	If you know the frequency of the station to be received, you can tune in the station easily by this system.
Auto tuning (for FM reception) Manual tuning (for MW/LW receiption)	These systems are convenient for receiving a station whose frequency has not been memorized, or to see what kind of programs are on the air.
Memory preset tuning	Once you program the frequencies into the memory, all you need to the tune in a station is to press the appropriate button.

When the wrong frequency is input

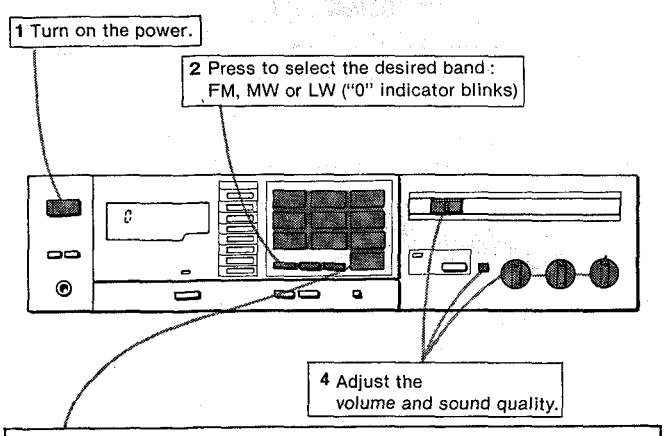
- If you mistakenly press a wrong figure, press the appropriate BAND selector again and input the correct frequency.
- If you input a frequency outside the reciver's frequency range (FM : 87.5 to 108 MHz, MW : 522 to 1602 kHz, LW : 153 to 344 kHz), the figures will flash on and off in the frequency/function display. In this case, press the appropriate BAND selector and input the proper frequency.

Notes on the AM direct access tuning

The last digit of the MW station frequency is always displayed according to the set AM frequency allocation system (intervales of 9 kHz). For example, even if you press the DERECT TUNING buttons 1, 3, 6, 7, "1368 kHz" will be displayed in the frequency/function display window.

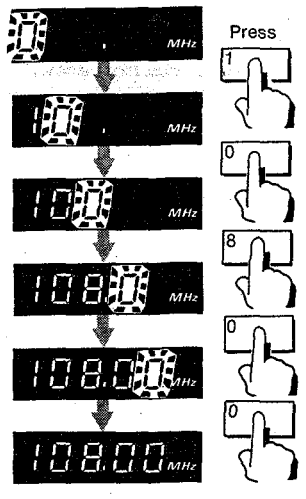
DIRECT ACCESS TUNING

Follow the numbered sequence.

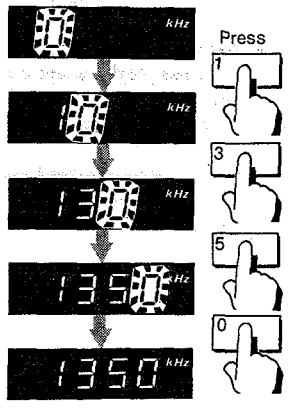


3 Pressing the DIRECT TUNING button, input the frequency of the station to be recived.

Example 1 : FM 108.00 MHz



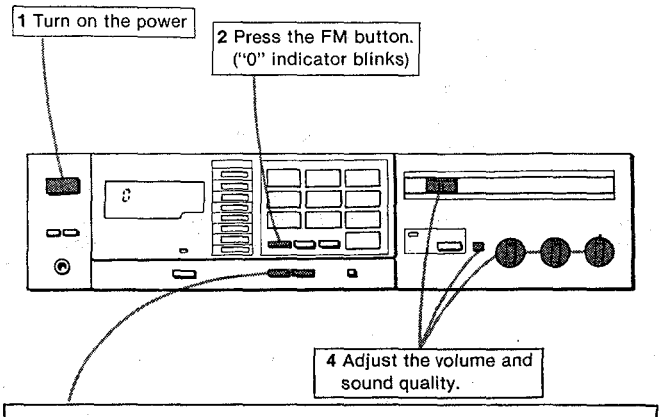
Example 2 : MW 1350 kHz



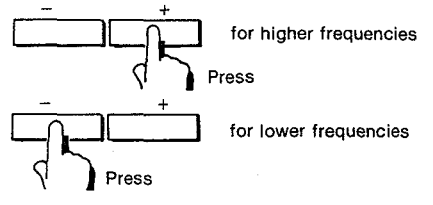
You can now hear the station whose frequncy yoy have just input.

AUTOMATIC TUNING (for FM reception)

Follow the numbered sequence.



3 Press the + or – TUNING button to start automatic frequency scanning. There is no need to hold the button down.



The frequency figures will change rapidly and stop when a signal is received. If the received signal is not the desired one, press the button again.

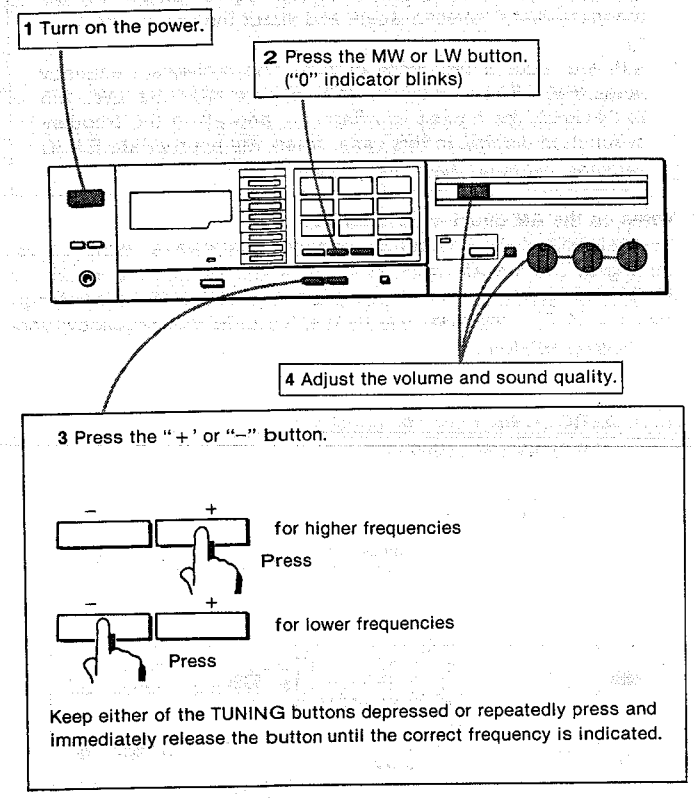
To stop the automatic tuning, press the MEMORY switch.

If the signal strength is weak, the frequency display figures will not stop at the desired frequency. When this happens, adjust the antenna for optimum reception. If the signal strength is still too weak for automatic tuning, tune in the station as described in "DIRECT ACCESS TUNING".

When the frequency figures reach the end of the tuning range of each band, the frequency will then be scanned from the opposite end of the tuning range.

MANUAL TUNING (for MW/LW reception)

Follow the numbered sequence.


1 Turn on the power.
2 Press the MW or LW button. ("0" indicator blinks)
4 Adjust the volume and sound quality.
3 Press the "+" or "–" button.
for higher frequencies
Press
for lower frequencies
Press
Keep either of the TUNING buttons depressed or repeatedly press and immediately release the button until the correct frequency is indicated.

To quickly tune in a roughly known frequency

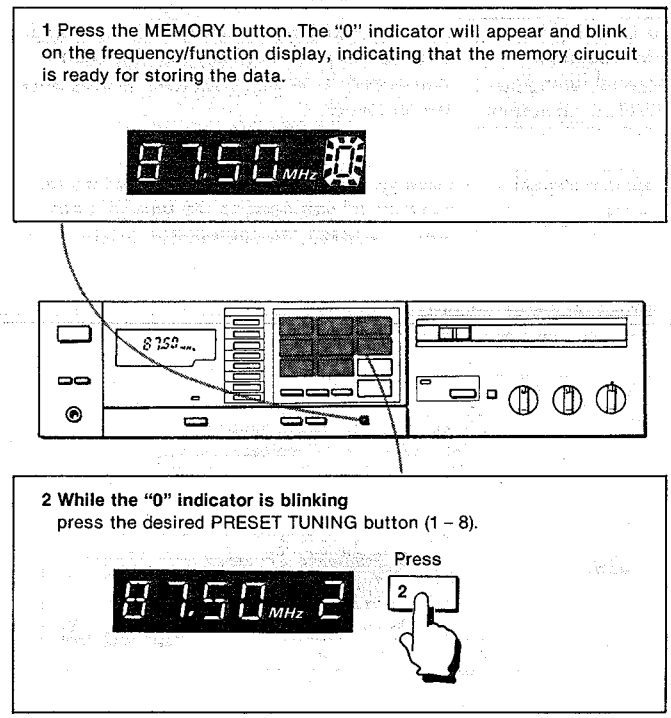
You can quickly tune in a FM, MW or LW station whose frequency is roughly known by combining the TUNING button operation with direct access tuning. Input the approximate frequency with the direct access tuning, then press either the "+" or "–" button. For example, if you believe your station is between 700 and 800 kHz, input 7 and press the "+" button, or input 8 and press the "–" button.

MEMORY PRESET TUNING

A total eight FM or MW/LW stations or a combination of both can be preset in any sequence.

To memorize station frequencies

To memorize a station, first tune in the station then follow the numbered sequence.


1 Press the MEMORY button. The "0" indicator will appear and blink on the frequency/function display, indicating that the memory cirucuit is ready for storing the data.
2 While the "0" indicator is blinking
press the desired PRESET TUNING button (1 – 8).
Press
2

Repeat these steps for each button.

Replace the station labels to conform to the selected pre-memorized stations. See "STATION LABEL INSERTION" on page 12.

Notes

- The "0" indicator will go off automatically after a few seconds. When the indicator is out, the memory circuit does not operate to memorize the station.
- The previous memory will be erased when a new frequency is programmed in to the memory of the same button. An erasure cannot be made without a new input.

To receive a pre-memorized station

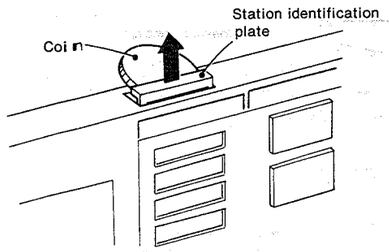
Turn the POWER switch on and simply press the desired PRESET TUNING button.

OTHER OPERATING INSTRUCTIONS

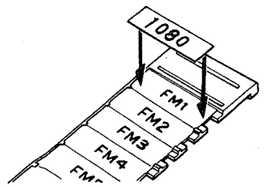
STATION LABEL INSERTION

Station labels are supplied for identification of the preset stations.
Affix the labels as follows:

❶ Pull out the station identification plate from the cutout with a coin or similar object.



❷ Pick out the appropriate tables for the pre-memorized station and affix them to the plate as shown, in the correct order.



❸ Replace the plate.

Check that the station labels match the pre-memorized stations by tuning in to each station.

REPRODUCTION OF PHONO, DAD/AUX AND TAPE PROGRAM SOURCES

Once you familiarize yourself with the operation of FM/MW/LW reception, you can listen to other program souces as follows:

❶ Set the control and switches at the initial setting position. (See page 9).
❷ Turn on the power and select the desired program source as required by using the TAPE MONITOR and FUNCITION switches.

Program	TAPE MONITOR switch	FUNCTION switches
Record playing	Released	Press PHONO (9).
Auxiliary source		Press DAD/AUX (0).
Taped program	Depress	Any

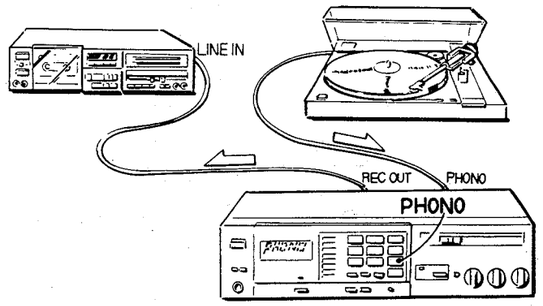
❸ Play the program source.
❹ Ajust the sound quality to your preference.

> The TAPE MONITOR switch has priority over the FUNCTION switches.
> If the TAPE MONITOR switch is depressed, you cannot listen to the program source selected by the FUNCTION switches.

TAPE RECORDING

❶ Select the program to be recorded with the FUNCITION switches.
❷ Release the TAPE MONITOR switch.
❸ Adjust the recording level.
❹ Start recording.

Note: The VOLUME, BASS, TREBLE and BALANCE controls and the LOUDNESS switch have no effect upon the recording.



Monitoring of a 3-head tape recorder

If your tape recorder has separate record and playback heads, you can monitor the recording results.
When the tape recorder used for recording is connected to the REC OUT jacks, depress the TAPE switch and you can monitor the recording results. To disengage the tape monitor function, press the TAPE switch again, and the source sound will be heard. Be sure to keep the monitor switch of the tape recorder in the TAPE position.

IC301 (microcomputer)

IC301 (TCP4621BP-6502) is a microcomputer IC.
The terminal functions are as follows:
Main Functions:

- Key input detection
- Fluorescent indicator tube (FIP301) indication output
- Data transmission to PLL OSC SYNTHESIZER IC (IC302: CX778A) (16 bit serial data)
- Control of function switch IC (IC502: CX770A) control signal

IC301 Terminal Functions

FL tube . . . Fluorescent Indicator Tube

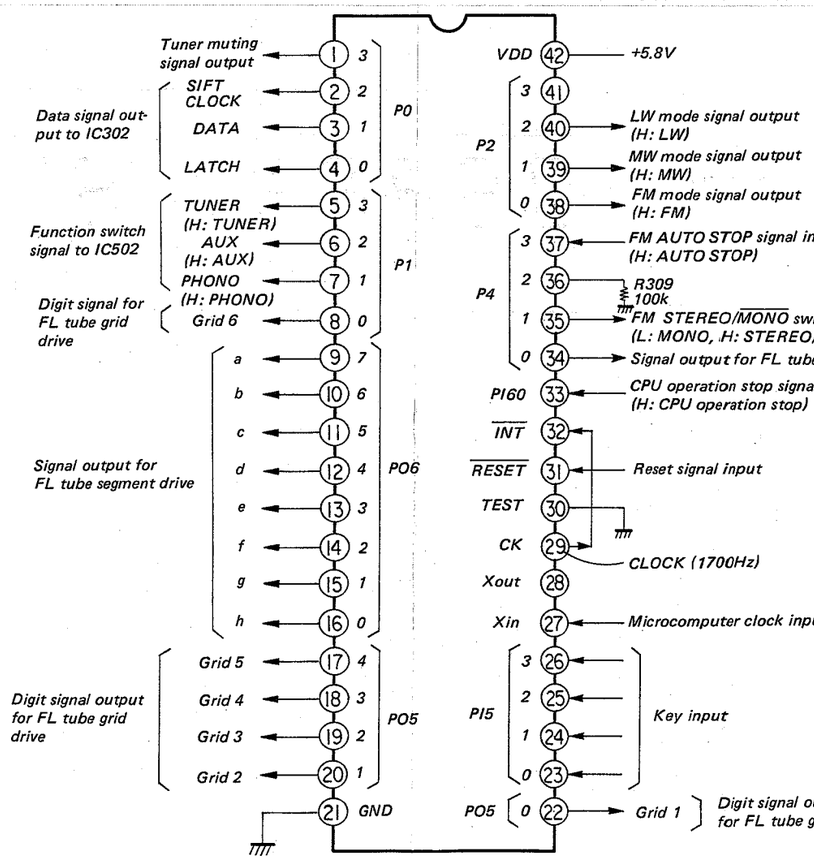


Fig. 1

Fluorescent Indicator Tube (FL Tube)

The FL tube performs indication of frequency received and function. The indication is done by the segment drive signal (see Fig. 3) and grid drive signal (see Fig. 4) output from IC301 (microcomputer).

The indication method is as follows. The grid is turned on in order (G1–G6), by time sharing, by the grid drive signal, and the a-h segment drive signal is sent out in conjunction with this.

For the "H" indication during "PHONO" indication, considering the "H" portion only, the "A" indication segment drive signal is output from IC301, and a high pulse is output from IC301 pin (34), timed with 'a' segment drive, and applied to Q304 base. Therefore, Q304 goes off and 'a' segment does not light up, but becomes "H" indication. (see Fig. 3)

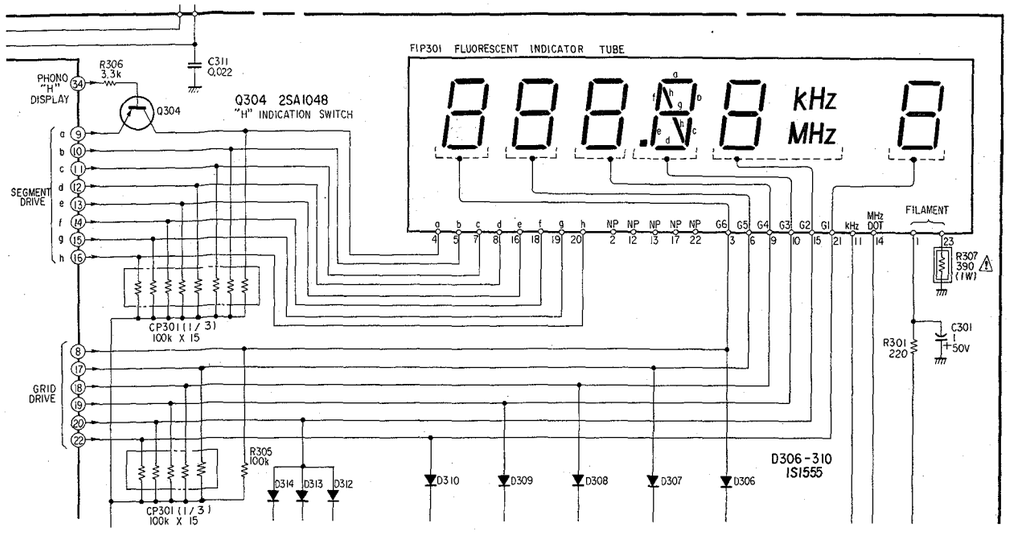


Fig. 2

"H" Indication during "PHONO" Indication and Segment Waveforms for "PHONO" Indication

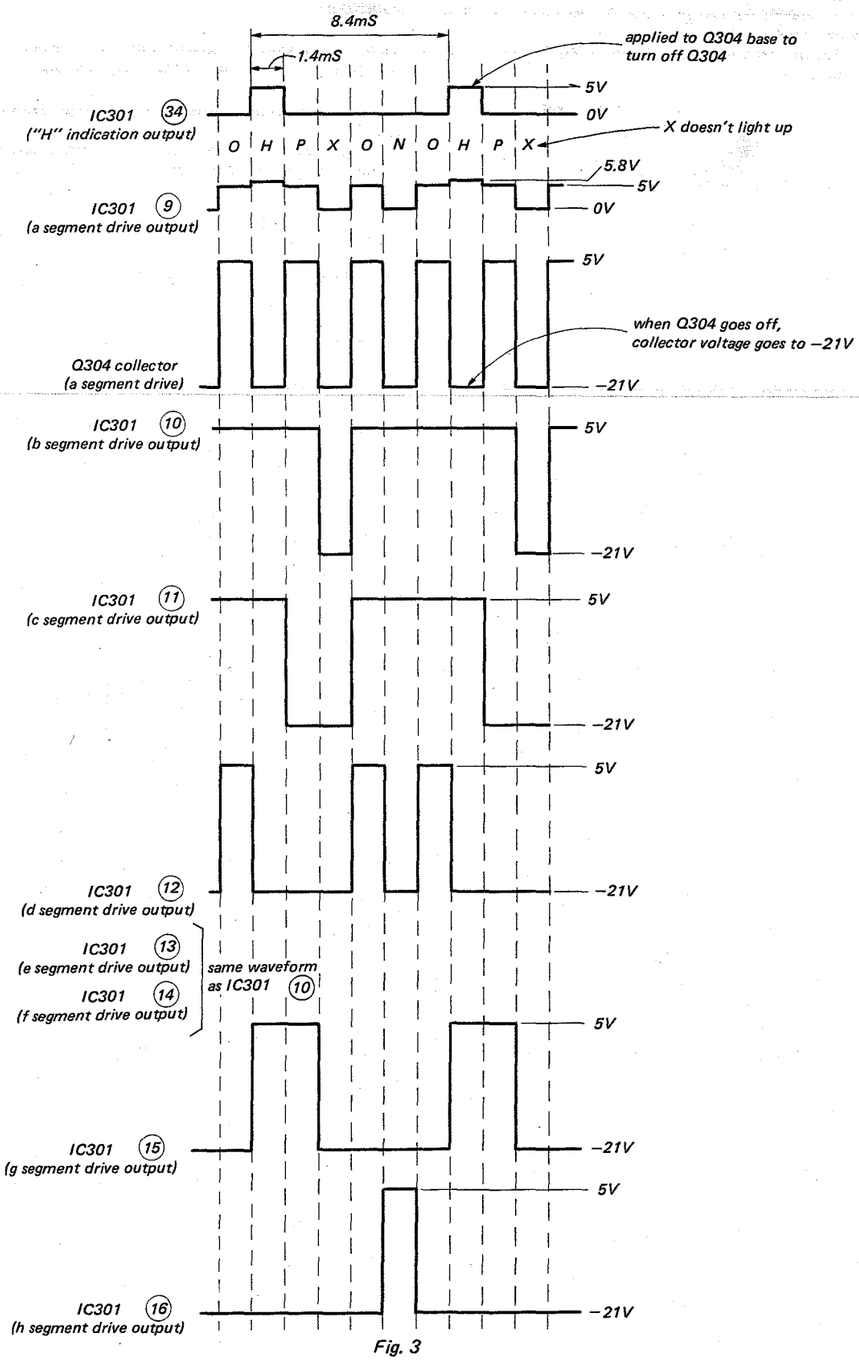

8.4mS
1.4mS
applied to Q304 base to turn off Q304
IC301 (34) ("H" indication output)
O H P X O N O H P X
X doesn't light up
5V
0V
5.8V
IC301 (9) (a segment drive output)
Q304 collector (a segment drive)
when Q304 goes off, collector voltage goes to –21V
–21V
IC301 (10) (b segment drive output)
IC301 (11) (c segment drive output)
IC301 (12) (d segment drive output)
IC301 (13) (e segment drive output)
IC301 (14) (f segment drive output)
same waveform as IC301 (10)
IC301 (15) (g segment drive output)
IC301 (16) (h segment drive output)

Fig. 3

Grid Drive Signal

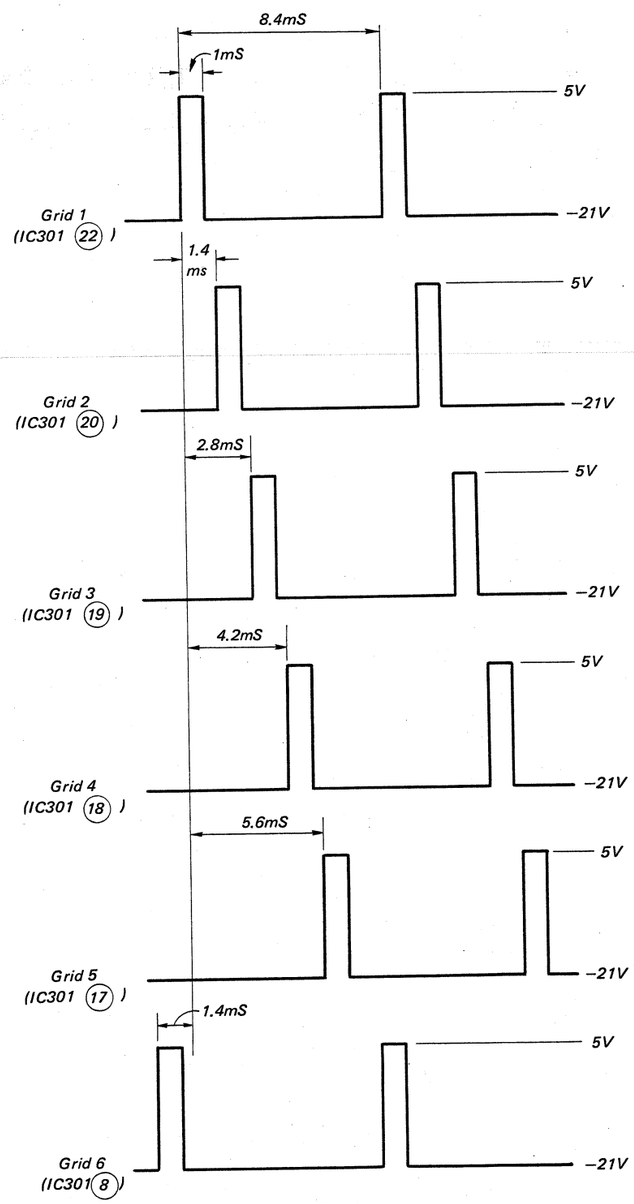
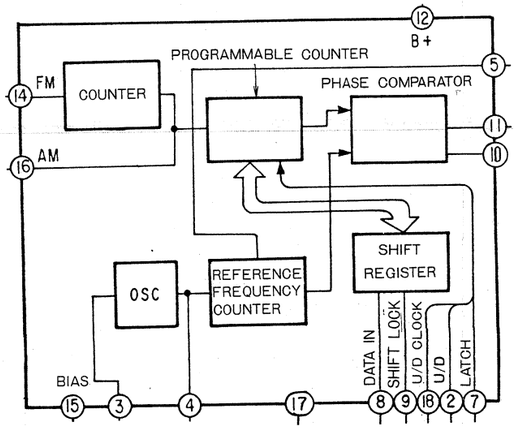


Fig. 4

IC302 (CX778A)

IC302 is the PLL synthesizer to control local oscillator frequency by comparing it with reference frequency. As the local oscillator output is directly (without any additional prescaler) supplied to the programmable counter section, reference frequency is as high as the channel spacing frequency. The benefits owing to this are the stable and almost ripple-less local oscillation and reduced spurious radiation.



As shown above, the programmable counter for changing frequency gets the data through the shift register.

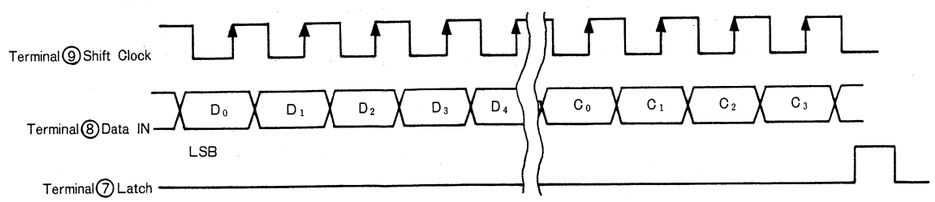
Function of Terminals

Pin No.	Mark	Function
1	Data Check	not used in this set
2	U/D	input terminal for selecting mode of built-in UP/DOWN counter HIGH level: UP mode LOW level: DOWN mode
3, 4	X_1, X_0	terminal for connecting crystal oscillator (7.2MHz)
5	Sys CLK	output terminal for system clock in phase comparator 360kHz
6	Fref	output terminal for reference frequency
7	Latch	input terminal for signal to let the shift register latch the data Data is latched at HIGH level
8	Data IN	input terminal for data
9	Shift CLK	input terminal for clock to let data input in 16-bit serial manner
10, 11	PD	output terminal for phase comparator (tristate)
12	V_{DD}	power supply (+5V)
14	FM IN	input terminal for signal from FM local oscillator
15	Sub	substrate
16	AM IN	input terminal for signal from AM local oscillator
17	GND	ground
18	U/D CLK	input terminal for UP/DOWN clock of UP/DOWN counter

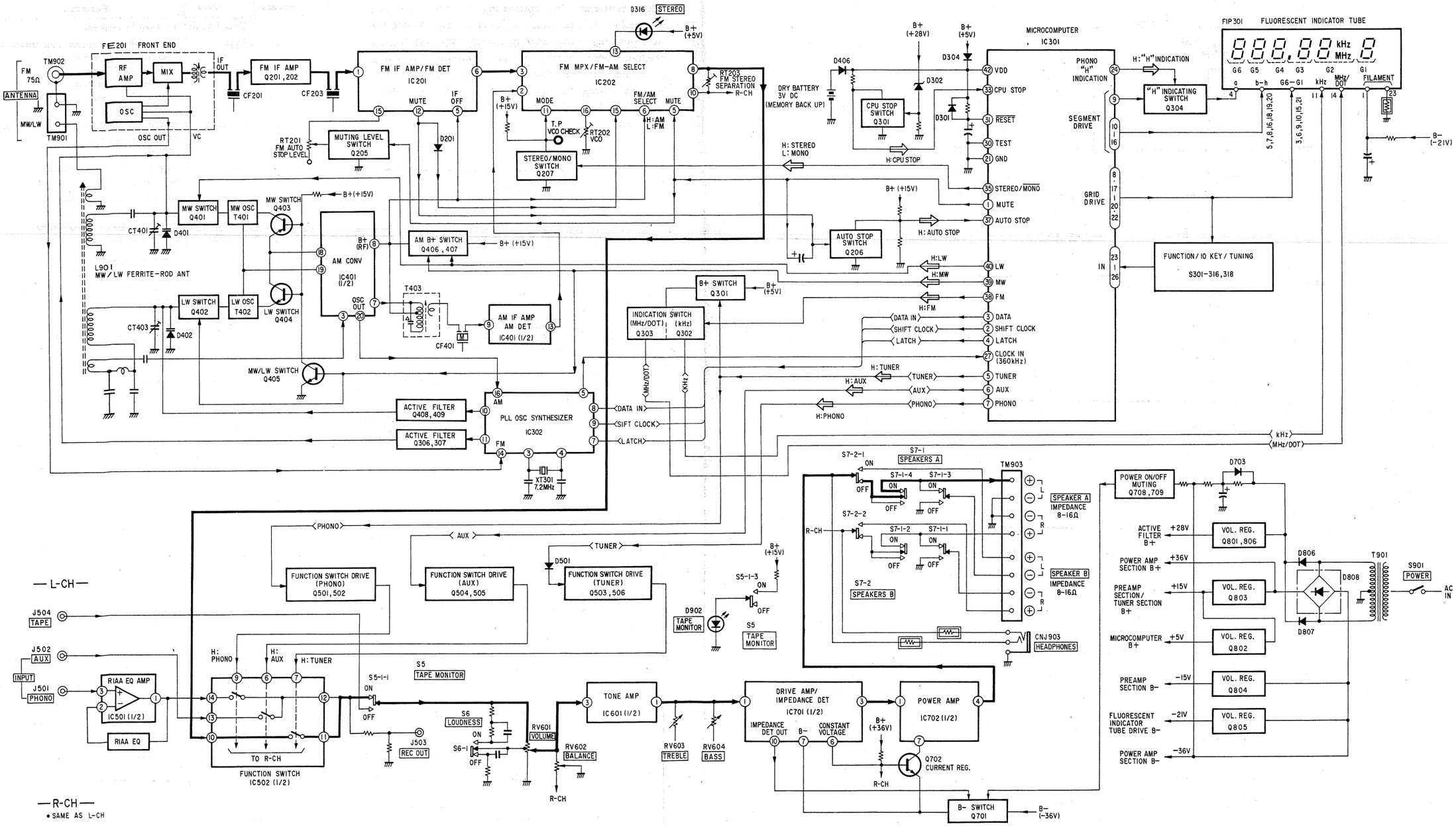
Data Input Procedure from Microcomputer:

- Setting of division ratio

Data for setting division ratio of the programmable counter, comparison frequency and the pin for input are input by 16-bit serial manner by using terminals DATA IN, SHIFT CLOCK and LATCH. The first 12 bits (D_0 – D_{11}) of this 16-bit data works for setting division ratio of the programmable counter and the last 4 bits (C_0 – C_3) works for controlling comparison frequency. Timing chart when data are input is as follows.



1-3. BLOCK DIAGRAM

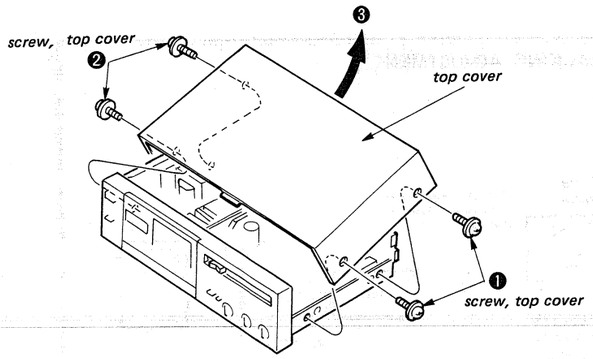


SECTION 2
DISASSEMBLY

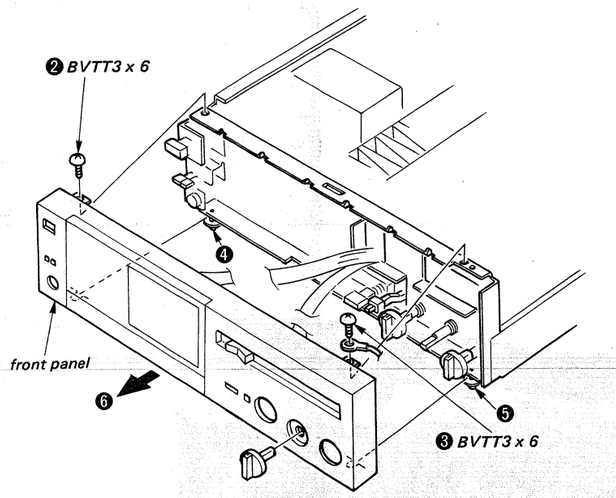
2-1. REMOVAL

Note: Follow the disassembly procedure in the numerical order given.

TOP COVER

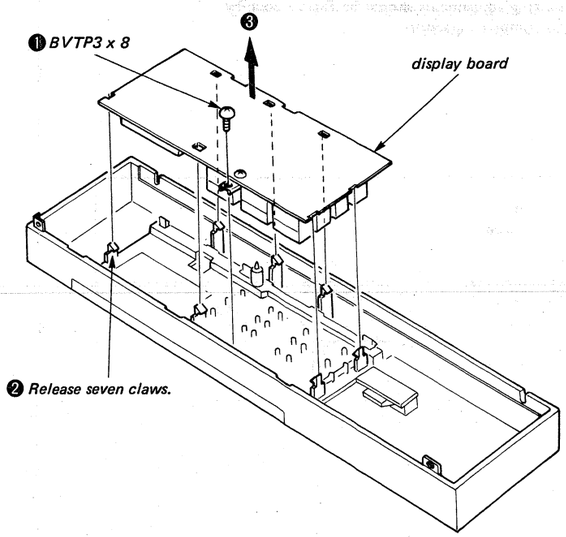


FRONT PANEL

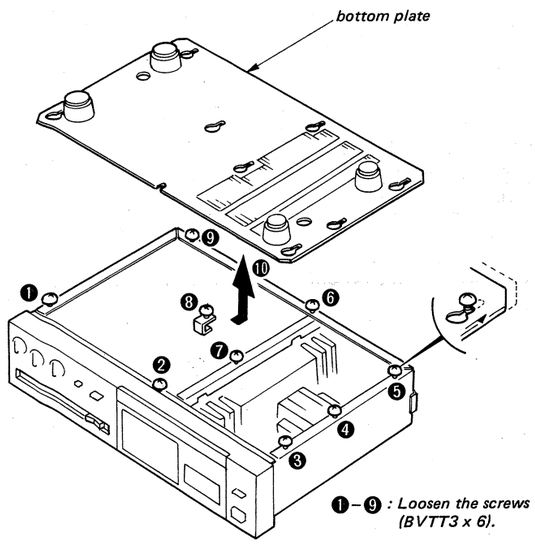


❹❺ : Loosen the screws (PTTWH3 x 6).

DISPLAY BOARD

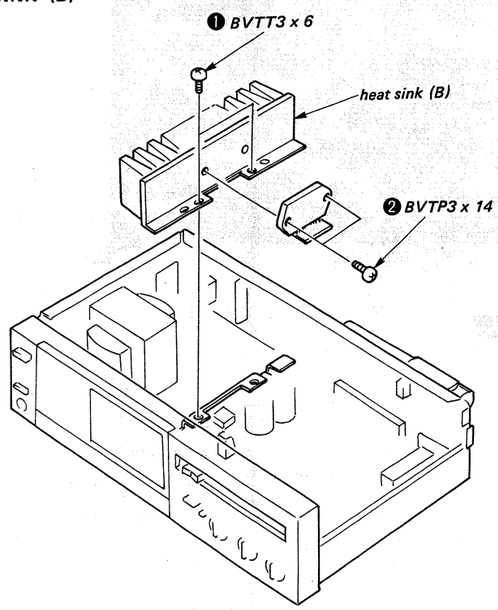


BOTTOM PLATE



❶–❾ : Loosen the screws (BVTT3 x 6).

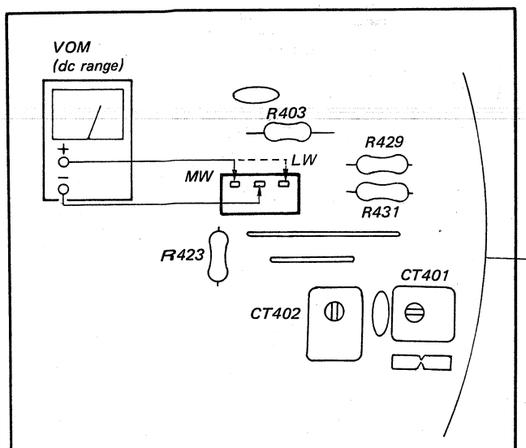
HEAT SINK (B)

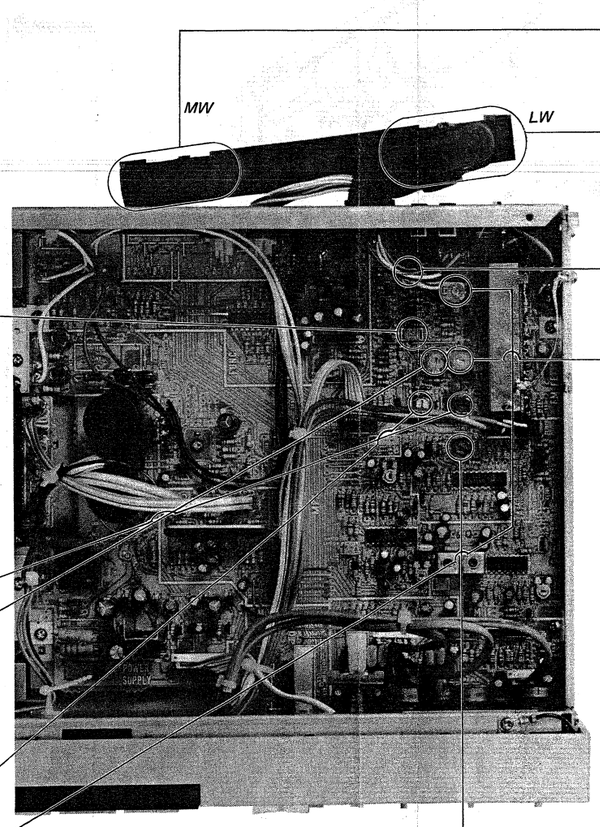


SECTION 3
ADJUSTMENTS

AM SECTION

- Repeat the procedures in each adjustment several times, and the frequency coverage and tracking adjustments should be finally done by the trimmer capacitors.





MW FREQUENCY COVERAGE ADJUSTMENT

frequency display in set	530kHz (9kHz step)	1,610kHz (9kHz step)
Voltage at test point (CV CHECK)	1.5V	22V
Adjustment part	T401	CT402

LW FREQUENCY COVERAGE ADJUSTMENT

frequency display in set	155kHz (1kHz step)	344kHz (1kHz step)
Voltage at test point (CV CHECK)	2.3V	18.5V
Adjustment part	T402	CT404

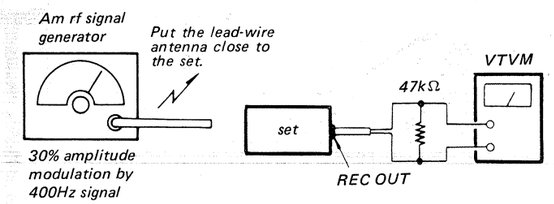
AM IF ALIGNMENT

Adjust for a maximum reading on VOM.

450kHz	T403

AM TRACKING ADJUSTMENT

Setting:



Procedure:

1. Tune the set to the SG signal
2. Adjust for a maximum reading on VTVM.

MW

	SG and set frequency	Adjustment part	Reading on VTVM
1.	600kHz	core of L901	Maximum
2.	1,400kHz	CT401	

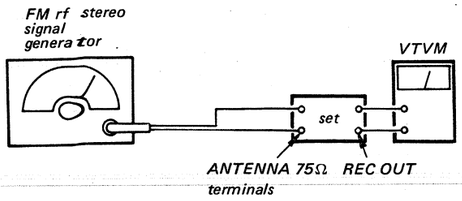
LW

	SG and set frequency	Adjustment part	Reading on VTVM
1.	170kHz	core of L901	Maximum
2.	310kHz	CT403	

FM SECTION

FM Stereo Separation Adjustment

Procedures:



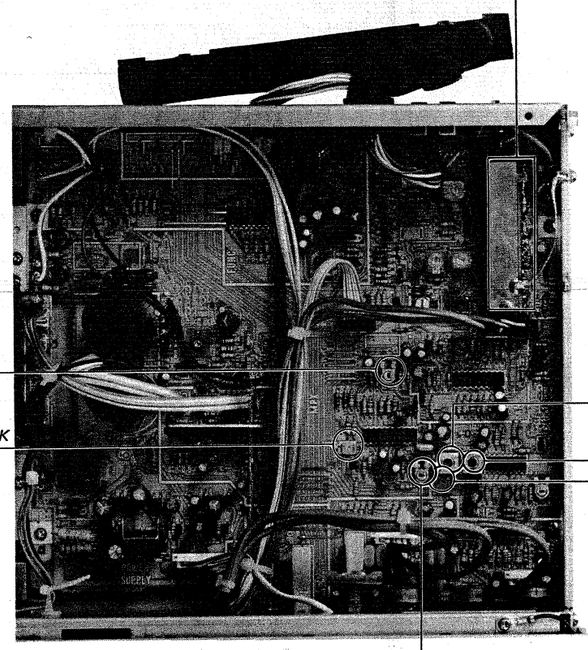
Carrier frequency: 98MHz
Output level: 1mV (60dB)
Modulation
Audio 400Hz: 16.25kHz deviation
Sub channel 38kHz: 16.25kHz deviation
Pilot signal 19kHz: 7.5kHz deviation

FM stereo signal generator output channel	VTVM connection	VTVM reading (dB)
L-CH	L-CH	Ⓐ
R-CH	L-CH	Ⓑ Adjust RT203 for minimum reading.
R-CH	R-CH	Ⓒ
L-CH	R-CH	Ⓓ Adjust RT203 for minimum reading.

L-CH Stereo separation: Ⓐ – Ⓑ
R-CH Stereo separation: Ⓒ – Ⓓ

The separations of both channels should be equal.

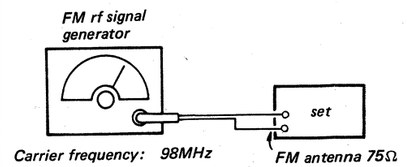
The FM front-end is carefully adjusted at the factory and is supplied as one whole block for replacement.



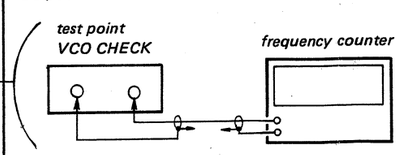
VCO Adjustment

A) Regular Method

Procedure:



Carrier frequency: 98MHz
Modulation: no modulation
Output level: 1mV (60dB)

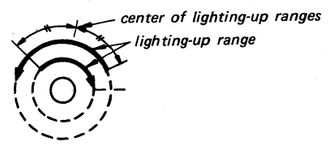


1. Tune the set to 98MHz.
2. Adjust RT202 for 19kHz ±50Hz on the counter.

B) Simple Method

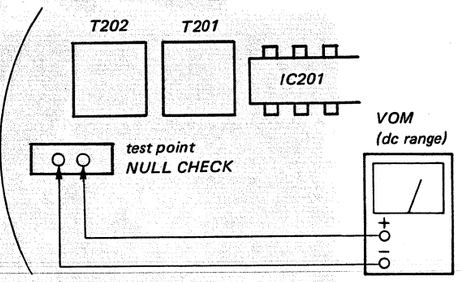
Procedure:

1. Tune the set to the FM stereo broadcasting signal.
2. Turn RT202 clockwise or counterclockwise and memorize the lighting-up range of stereo lamp.
3. Secure RT202 at the center of the lighting-up range of both turns as shown below.



FM Discriminator Adjustment 1

Setting:



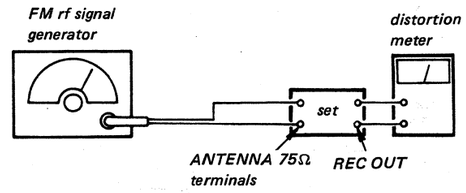
Procedure:

1. Tune the set in the strong station-signal.
2. Adjust the black core (primary-side) of T201 for 0V reading on VOM.

Note: When replacing the ceramic filter perform this alignment.

FM Discriminator Alignment 2

Setting:

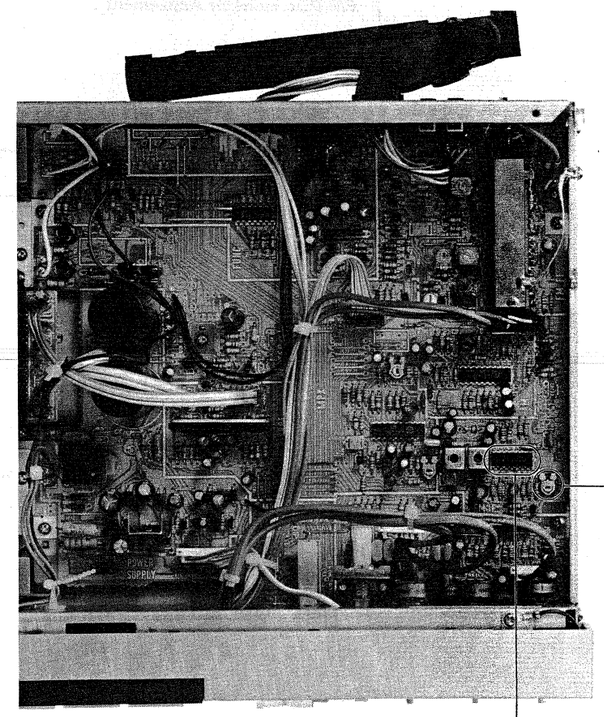


Carrier frequency: 98MHz
Modulation: 400Hz, 40kHz deviation (100%)
Output level: 10μV (20dB)

Procedure:

Adjust the white core (secondary side) of T202 for minimum distortion.

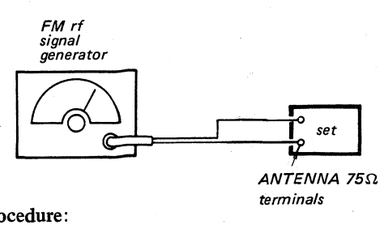
Note: When replacing the ceramic filter, perform this alignment.
Repeat the secondary-side and primary-side alignments several times.

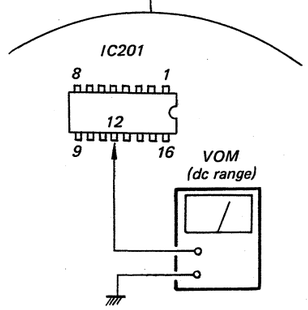


RT201

FM Auto Stop Level Adjustment

Setting:





Procedure:

Carrier frequency: *98MHz*
Modulation: *400Hz, 40kHz deviation (100%)*
Output level: *56μV (35dB)*

1. Tune the set to 98MHz by pressing the TUNING buttons.
2. Adjust RT201 to the position where the VOM reading changes from 5.8V to 0V.

MEMO

SECTION 4
DIAGRAMS

Note:

- All capacitors are in μF unless otherwise noted. pF : μμF 50WV or less are not indicated except for electrolytics and tantalums.
- All resistors are in ohms, ¼ W unless otherwise noted. kΩ : 1000 Ω, MΩ : 1000 kΩ
- : nonflammable resistor.
- : fusible resistor.
- △ : internal component.
- Voltages are dc with respect to ground unless otherwise noted.
- Readings are taken under detuned conditions with a VOM.

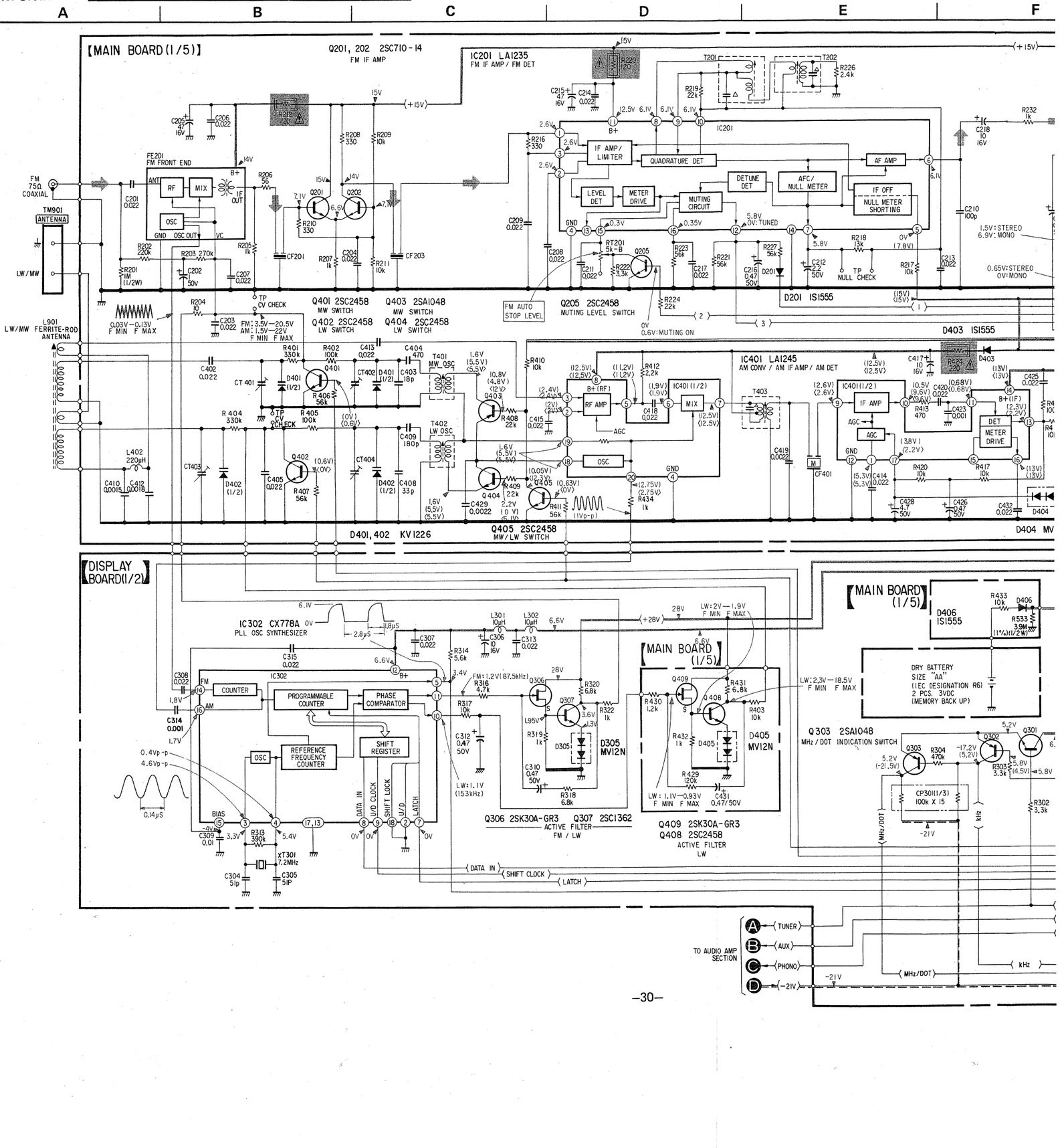
  No mark : FM
  ( ) : MW
  < > : LW
- Voltage variations may be noted due to normal production tolerances.
- Switch

Ref. No.	Switch	Position
S301	FM	OFF
S302	MW	OFF
S303	LW	OFF
S304	FM MODE	OFF
S305	1	OFF
S306	2	OFF
S307	3	OFF
S308	4	OFF
S309	5	OFF
S310	6	OFF
S311	7	OFF
S312	8	OFF
S313	9, PHONO	OFF
S314	0, DAD/AUX	OFF
S315	TUNING –	OFF
S316	TUNING +	OFF
S318	MEMORY	OFF

- : signal path

Note: Voltages are measured with a VOM (50kΩ/V).

Note: The components identified by shading and mark ⚠ are critical for safety. Replace only with part number specified.



F G H I J K L M

1 2 3 4 5

Q207 2SC2458
STEREO / MONO SELECT SWITCH

IC202 LA3390
FM MPX / FM-AM SELECT

IC202

FM STEREO SEPARATION

MPX

P·L·L

LED DRIVE

FM/AM SELECT

MUTING

1.5V : STEREO
6.9V : MONO

0.65V : STEREO
0V : MONO

TP VCO CHECK

VCO

RT202 10k-B

RT203 50k-B

TUNER L-CH

TUNER R-CH

TO AUDIO AMP SECTION

【DISPLAY BOARD(1/2)】

STEREO

D316 GL9PR9

D316

TO AUDIO AMP SECTION

D403 IS1555

D404 MV12N

Q406 2SA1048
AM B+ SWITCH

Q407 2SC2458
AM B+ SWITCH

DET METER DRIVE

D301, 304 IS1555

IC301

CPU STOP

CLOCK (1700Hz)

INT

RESET

TEST

GND

STEREO / MONO

MUTE

AUTO STOP

MW

FM

LW

DATA

SHIFT CLOCK

LATCH

CLOCK IN (360kHz)

CLOCK OUT

TUNER

AUX

PHONO

Q305 2SC2458
CPU STOP SWITCH

D406 IS1555

DRY BATTERY
SIZE "AA"
(IEC DESIGNATION R6)
2 PCS. 3VDC
(MEMORY BACK UP)

D302 EQA01-25R

Q301 2SC2458
B+ SWITCH

Q302 2SA1048
kHz INDICATION SWITCH

Q206 2SC2458
AUTO STOP SWITCH

[MAIN BOARD(1/5)]

IC301 TCP4621BP-6502
MICROCOMPUTER

PHONO "H" DISPLAY

Q304 2SA1048
"H" INDICATION SWITCH

SEGMENT DRIVE

GRID DRIVE

CP301(1/3)
100k X 15

D311-314 IS1555

D306-310 IS1555

FIP301 FLUORESCENT INDICATOR TUBE

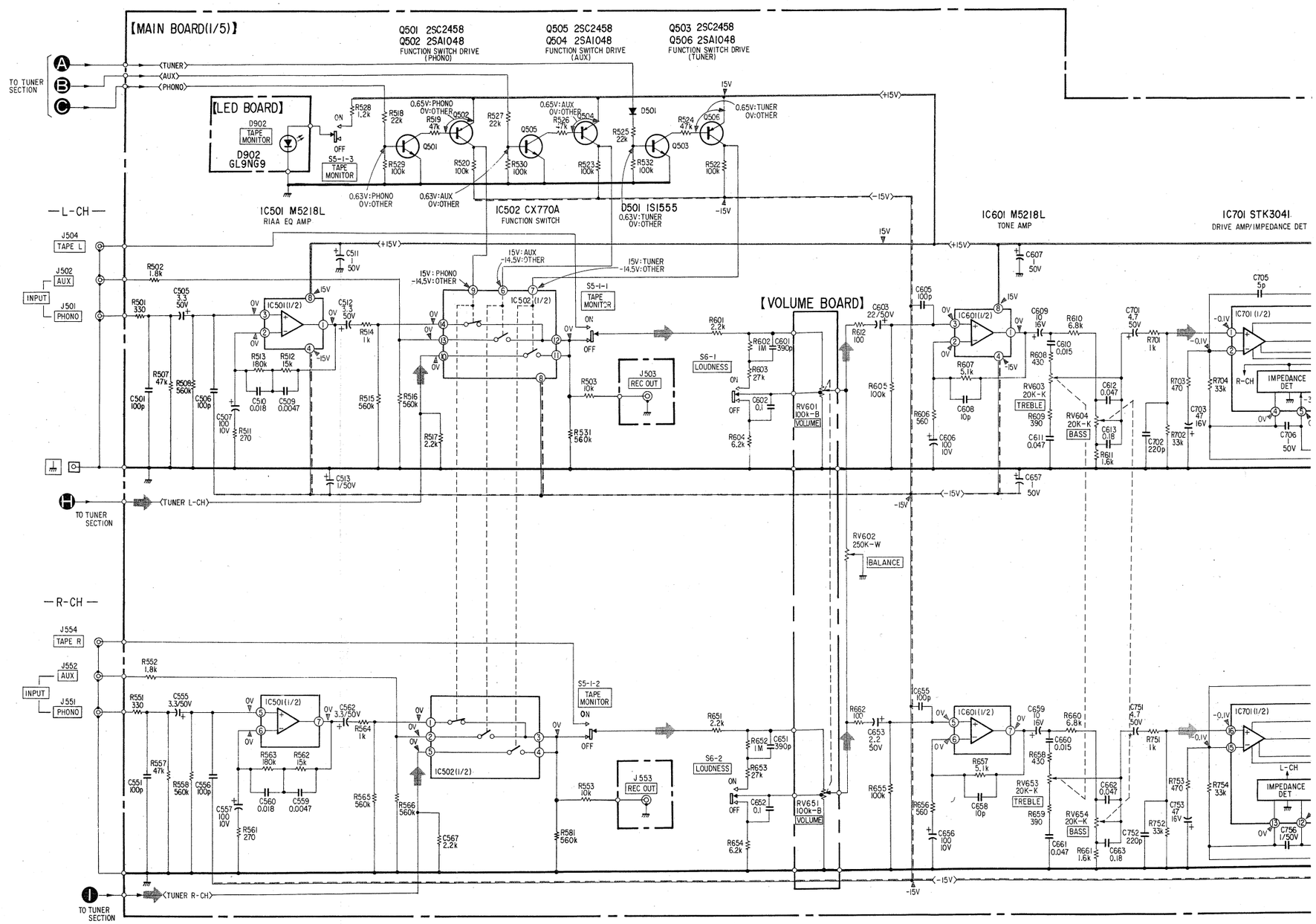
FILAMENT

DIRECT TUNING

S301 FM
S305 1
S306 2
S307 3
S316 TUNING +
S302 MW
S308 4
S309 5
S310 6
S315 TUNING −
S303 LW
S311 7
S312 8
S313 9 PHONO
S304 MODE
S318 MEMORY
S314 DAD/AUX
STEREO/MONO

FUNCTION / IOKEY TUNING

4-2. SCHEMATIC DIAGRAM (2) — Function Switch/Amplifier/Power Supply Section —



Note:

- All capacitors are in μF unless otherwise noted. pF : μμF 50WV or less are not indicated except for electrolytics and tantalums.
- All resistors are in ohms, ¼W unless otherwise noted. kΩ : 1000Ω, MΩ : 1000kΩ
- : nonflammable resistor.
- : fusible resistor.
- △ : internal component.
- Voltages are dc with respect to ground unless otherwise noted.
- Readings are taken under detuned conditions with a VOM.
  No mark : FM
  ( ) : MW
  < > : LW
- Voltage variations may be noted due to normal production tolerances.
- Switch

Ref. No.	Switch	Position
S5	TAPE MONITOR	OFF
S6	LOUDNESS	OFF
S7-1	SPEAKER B	OFF
S7-2	SPEAKER A	ON
S901	POWER	OFF

- : signal path

Note: Voltages are measured with a VOM (50kΩ/V).

Note: The components identified by shading and mark ⚠ are critical for safety. Replace only with part number specified.

F G H I J K L M

1 2 3 4 5

IC701 STK3041
DRIVE AMP/IMPEDANCE DET

Q702 2SC2458
CURRENT REG.

IC702 STK2129
POWER AMP

【IC BOARD(1/2)】

【SPEAKER SW BOARD】

S7-1-1 ON
S7-2
SPEAKERS A
S7-1-2 ON
S7-1
SPEAKERS B
OFF
S7-2-4
S7-2-3
S7-2-2
S7-2-1

TM903
SPEAKER A
IMPEDANCE 8-16Ω
SPEAKER B
IMPEDANCE 8-16Ω
CNJ903
HEADPHONES

Q708,709 2SA1048
POWER ON/OFF MUTING

D703 10E2

Q701 2SA1048
B- SWITCH

Q801 2SC2458
Q806 2SK246
VOL. REG.

Q802 2SC2458
VOL. REG.

Q803
2SD880
VOL. REG.

D803
EQA01-16R

D806,807
10E2
RECT

D808 S4VB40
RECT

【BREAKER BOARD】

【OUTLET BOARD】

CB902
1.25A-250V
F901
1.25A
S901 ON POWER OFF
AC IN
CNP901
CNJ901
CNJ902
AC OUTLET
SWITCHED TOTAL 100W MAX

※ NOT REPLACEBLE:BUILT IN TRANSFORMER.

D801 EQA01-28R

D804
EQA01-16R

D805
EQA01-21R

D802
HZ7B3

Q752 2SC2458
CURRENT REG.

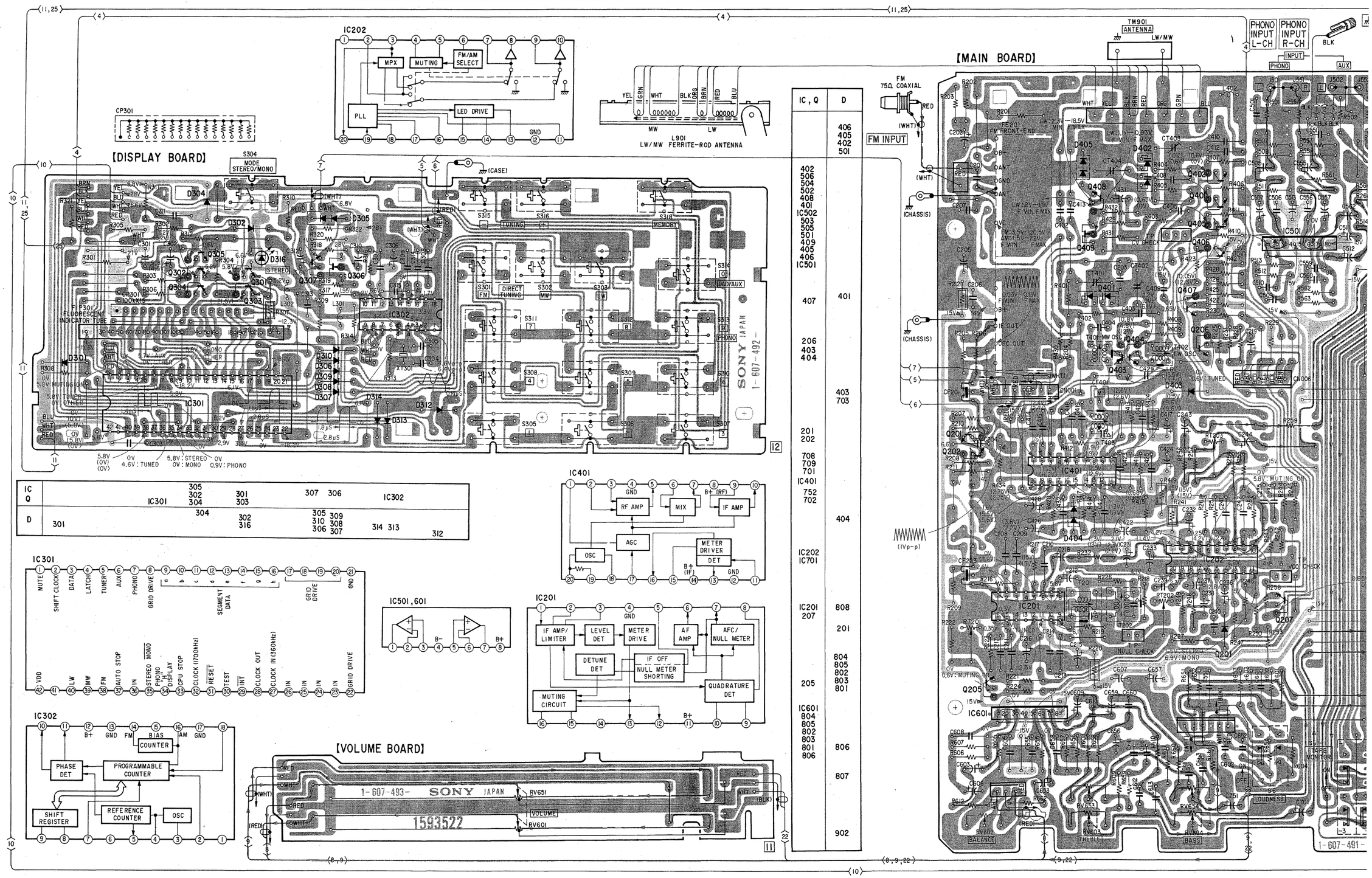
Q804 2SA1048
VOL. REG.

Q805 2SB740
VOL. REG.

TO TUNER SECTION

4-3. MOUNTING DIAGRAM

• See page 41 for Semiconductor Lead Layouts.

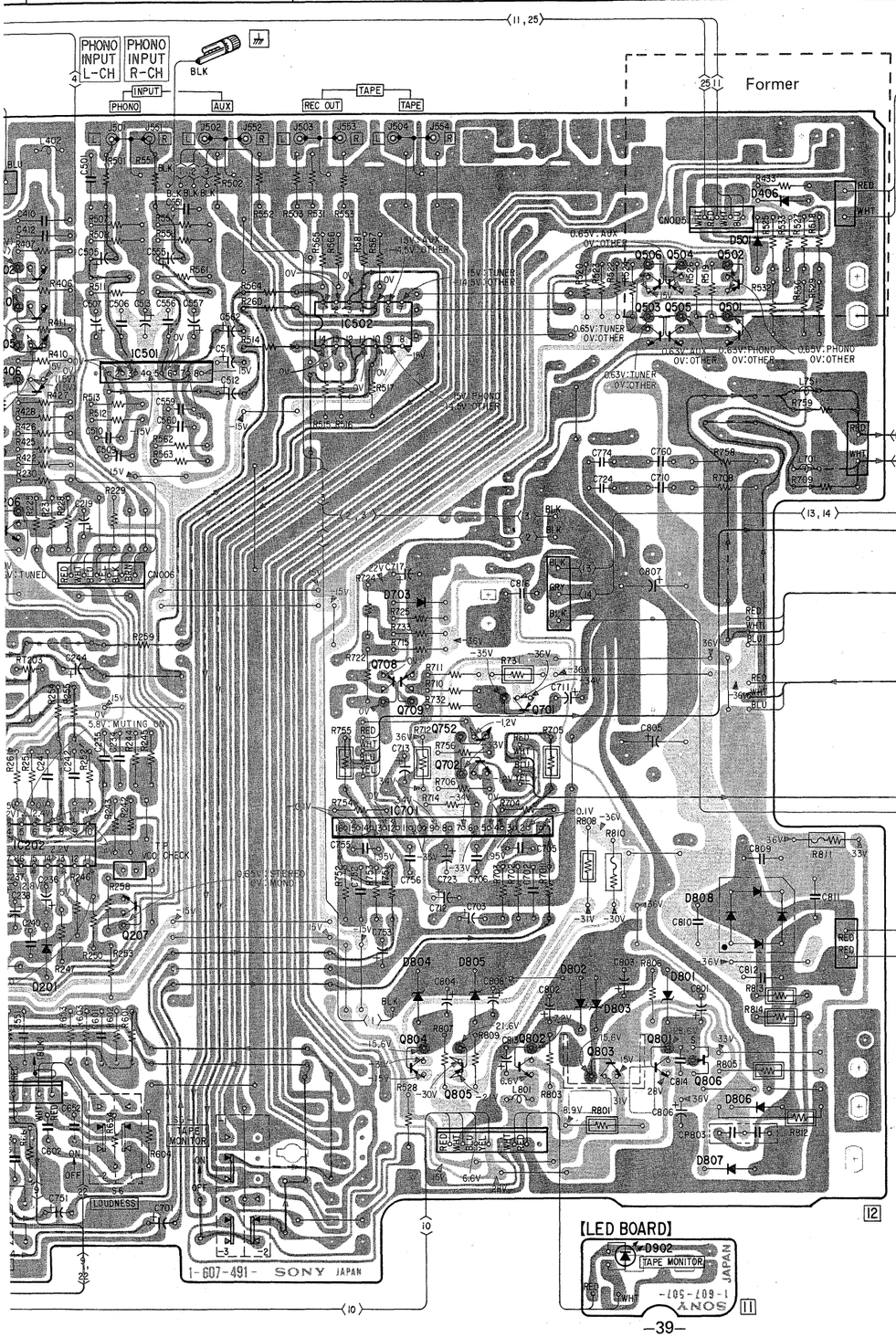


IC / Q										
		IC301	305 302 304	301 303	307	306	IC302			
D	301		304	302 316	305 310 306	309 308 307	314	313	312	

IC, Q	D
	406
	405
	402
	501
402	
506	
504	
502	
408	
401	
IC502	
503	
505	
501	
409	
405	
406	
IC501	
407	401
206	
403	
404	
	403
	703
201	
202	
708	
709	
701	
IC401	
752	
702	
	404
IC202	
IC701	
IC201	808
207	201
	804
	805
	802
205	803
	801
IC601	
804	
805	
802	
803	
801	806
806	
	807
	902

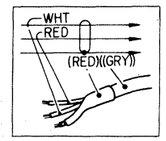
H I J K L M N O

1 2 3 4 5



Note:

- Color code of sleeving over the end of the jacket.

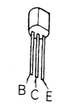


- [ ]— : indicates side identified with part number.
- : B + pattern
- : B — pattern
- : signal path
- : L-CH signal path
- : R-CH signal path

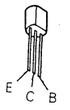
SEMICONDUCTOR LEAD LAYOUTS

2SA1048
2SC2458

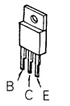
2SC710-14



2SC1362
2SB740

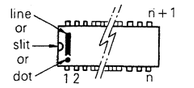


2SD880



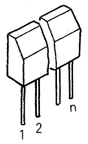
2SK30A-GR3
2SK246

CX770A
CX778A
LA1235
LA1245
LA3390
TCP4621BP-6502

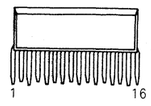


(Top view)

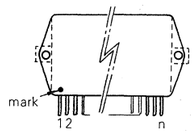
M5218L



STK3041

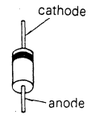


STK2129

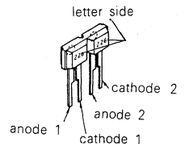


(Marking side view)

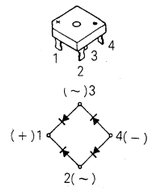
1S1555
10E2
EQA01-16R
EQA01-21R
EQA01-25R
EQA01-28R
EQB01-16
EQB01-21
EQB01-25
EAB01-28
RD7.5E-B1



KV1226

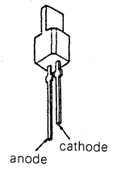


S4VB40



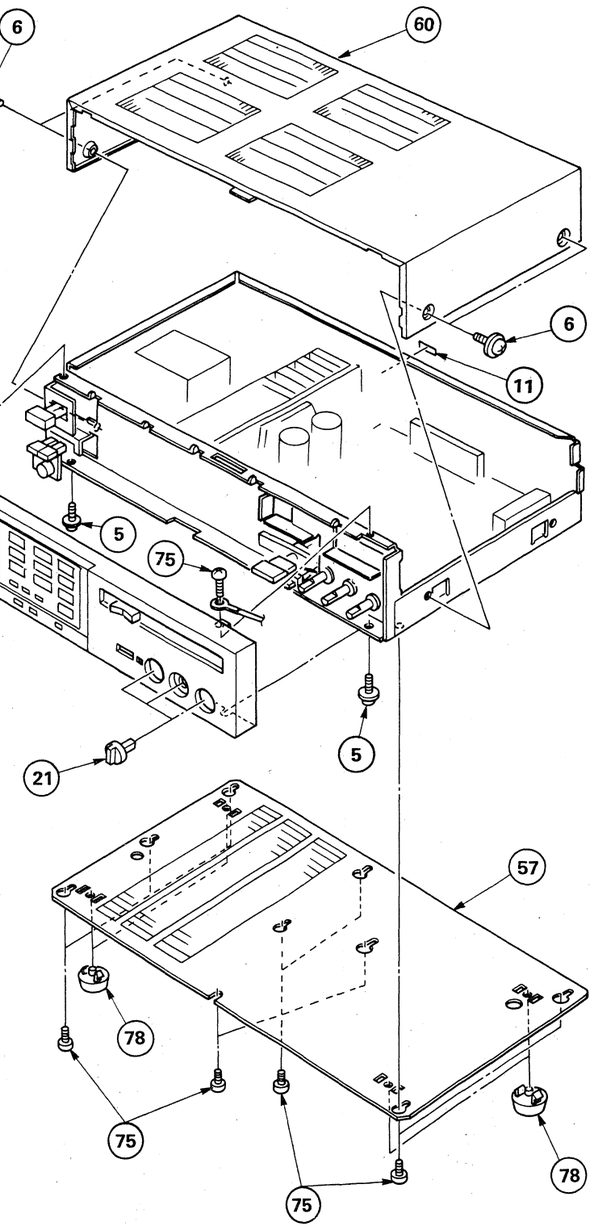
MV12N

GL9PR9
GL9NG9

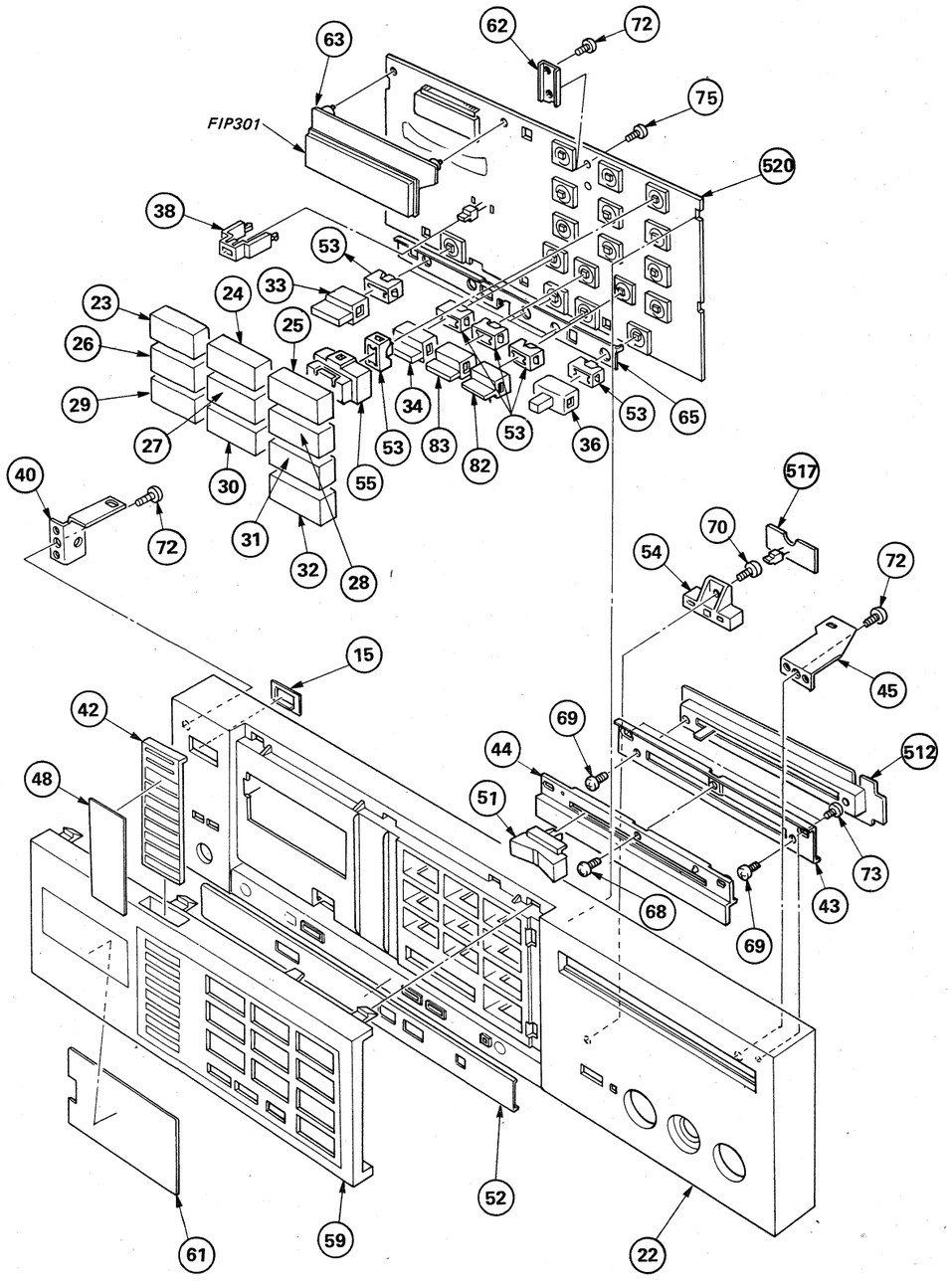


SECTION 5
EXPLODED VIEWS AND PARTS LIST

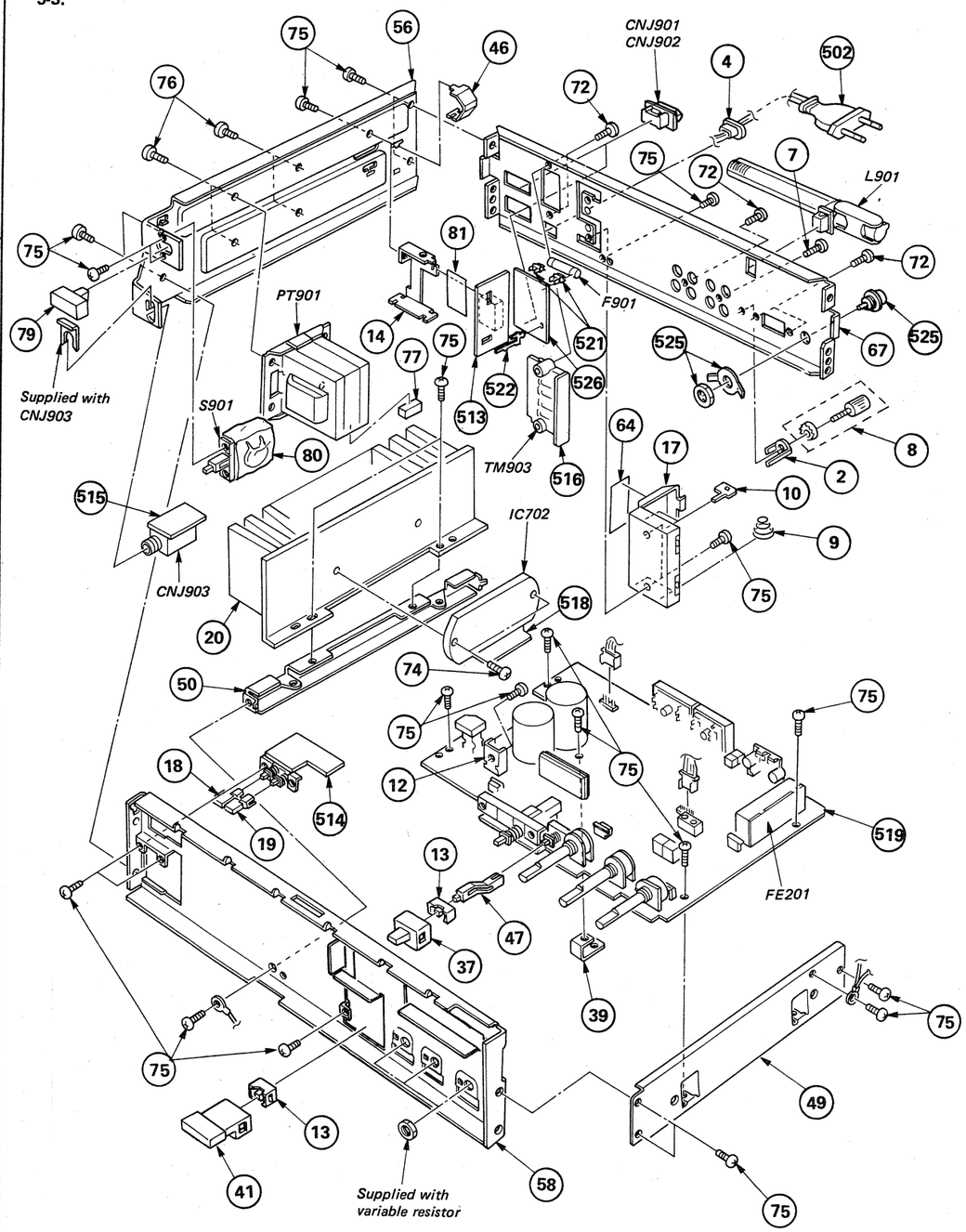
5-1.



5-2.


FIP301
63
62
72
75
520
38
53
23
24
33
25
26
29
27
30
34
53
83
82
53
36
53
65
55
40
72
31
32
28
517
70
54
72
45
15
42
48
44
69
51
512
73
43
68
69
52
61
59
22

5-3.


75
56
46
76
CNJ901
CNJ902
4
502
72
7
L901
75
72
72
81
PT901
F901
79
14
77
75
521
525
67
525
Supplied with
CNJ903
S901
513
522
526
64
17
8
80
TM903
516
2
515
IC702
10
9
CNJ903
75
518
20
50
74
75
12
75
75
18
514
19
519
13
FE201
47
37
39
75
75
49
13
41
Supplied with
variable resistor
58
75

GENERAL SECTION

No.	Part No.	Description
1	.....	
2	3-701-993-00	SPACER, TERMINAL
3	.....	
4	3-703-244-00	BUSHING, CORD
5	3-703-249-01	SCREW, S TIGHT, +PTTWH 3X6
6	3-703-354-11	SCREW (OS), CASE, CLAW
7	3-703-473-00	SCREW, TERMINAL
8	3-706-165-00	SCREW
9	3-883-424-00	SPRING
10	3-883-428-00	PLATE, TERMINAL (POSITIVE)
11 ♦	4-844-449-00	LABEL
12 ♦	4-857-562-00	HEAT SINK, TR
13	4-864-307-00	RING
14 ♦	4-868-906-00	BRACKET, BREAKER
15	4-871-324-00	ESCUTCHEON, POWER KNOB
16	.....	
17	4-875-530-00	CASE, BATTERY
18	4-876-722-01	KNOB (4X10), SQUARE
19	4-876-722-11	KNOB (4X10), SQUARE
20 ♦	4-881-415-00	HEAT SINK (A)
21	4-881-520-01	KNOB (DIA. 18)
22	4-881-701-41	PANEL (B)
23	4-881-703-01	CAP, KNOB (12X25), SQUARE
24	4-881-703-11	CAP, KNOB (12X25), SQUARE
25	4-881-703-21	CAP, KNOB (12X25), SQUARE
26	4-881-703-31	CAP, KNOB (12X25), SQUARE
27	4-881-703-41	CAP, KNOB (12X25), SQUARE
28	4-881-703-51	CAP, KNOB (12X25), SQUARE
29	4-881-703-61	CAP, KNOB (12X25), SQUARE
30	4-881-703-71	CAP, KNOB (12X25), SQUARE
31	4-881-703-81	CAP, KNOB (12X25), SQUARE
32	4-881-703-91	CAP, KNOB (12X25), SQUARE
33	4-881-704-01	KNOB (5X16), SQUARE
34	4-881-704-11	KNOB (5X16), SQUARE
35	.....	
36	4-881-705-01	KNOB (5X6), SQUARE
37	4-881-705-11	KNOB (5X6), SQUARE
38 ♦	4-881-706-00	HOLDER (B), LED
39 ♦	4-881-707-00	BRACKET, PC BOARD
40 ♦	4-881-708-00	BRACKET (LEFT), PANEL
41	4-881-709-00	KNOB (5X19), SQUARE
42	4-881-710-00	HOLDER, STATION
43 ♦	4-881-711-00	BRACKET, CONTROL
44	4-881-712-00	PLATE, ORNAMENTAL, CONTROL
45 ♦	4-881-713-00	BRACKET (RIGHT), PANEL

GENERAL SECTION

No.	Part No.	Description
46 ♦	4-881-714-00	PROTECTOR
47 ♦	4-881-717-00	JOINT
48	4-881-719-00	LABEL, STATION
49 ♦	4-881-721-00	PLATE (RIGHT), SIDE
50 ♦	4-881-722-00	BRACKET, HEAT SINK
51	4-881-723-00	KNOB, CONTROL, SLIDE
52	4-881-724-11	PLATE, ORNAMENTAL
53	4-881-725-00	RING (TACT), FLEXIBLE
54 ♦	4-881-727-00	HOLDER (A), LED
55	4-881-728-00	BASE, KNOB (12X25), SQUARE
56 ♦	4-881-729-00	PLATE (LEFT), SIDE
57 ♦	4-881-730-00	PLATE, BOTTOM
58 ♦	4-881-732-00	PANEL (B), SUB
59 ♦	4-881-733-21	PANEL, 10 KEY
60	4-881-736-00	CASE
61	4-881-737-00	FILTER
62 ♦	4-881-743-00	HOLDER, DISPLAY
63 ♦	4-881-744-00	HOLDER, FL TUBE
64 ♦	4-881-747-00	LABEL, BATTERY
65 ♦	4-881-751-02	CASE, SHIELD
66	.....	
67 ♦	4-881-902-11	PLATE, JACK
68	7-621-284-00	SCREW +P 2.6X4
69	7-682-145-01	SCREW +P 3X4
70	7-685-134-11	SCREW +P 2.6X8 TYPE2 NON-SLIT
71	7-685-645-71	SCREW +BVTP 3X6 TYPE2 SLIT
72	7-685-646-11	SCREW +BVTP 3X8 TYPE2 N-S
73	7-685-648-11	SCREW +BVTP 3X12 TYPE2 N-S
74	7-685-649-11	SCREW +BVTP 3X14 TYPE2 N-S
75	7-685-871-01	SCREW +BVTT 3X6 (S)
76	7-685-880-01	SCREW +BVTT 4X6 (S)
77	9-911-846-XX	CUSHION
78	X-4864-303-0	FOOT ASSY
79	X-4875-108-0	KNOB ASSY, POWER
80	3-559-001-01	COVER, POWER SWITCH
81 ♦	4-854-027-00	INSULATOR
82	4-881-704-31	KNOB (5X16), SQUARE
83	4-881-704-41	KNOB (5X16), SQUARE

NOTE:
- Items with no part number and no description are not stocked because they are seldom required for routine service.
- Items marked " ♦ " are not stocked since they are seldom required for routine service. Some delay should be anticipated when ordering these items.
- Due to standardization, parts with part numbers (Δ-ΔΔΔ-ΔΔΔ-XX or Δ-ΔΔΔΔ-ΔΔΔ-X) may be different from those used in the set.

CAPACITORS:
- All capacitors are in μF. Common capacitors are omitted. Refer to the following lists for their part numbers. MF:μF, PF:μμF.

RESISTORS
- All resistors are in ohms. Common 1/4W, 1/8W and 1/16W carbon resistors are omitted. Refer to the following lists for their part numbers.
- F : nonflammable

COILS
- MMH : mH, UH : μH

The components identified by shading and mark ⚠ are critical for safety. Replace only with part number specified.

SEMICONDUCTORS
In each case, U : μ, for example:
UA···: μA···, UPA···: μPA···, UPC···: μPC, UPD···: μPD···

ACCESSORY & PACKING MATERIAL

No.	Part No.	Description
101	.....	
102	1-528-027-11	BATTERY, NEW SUPER (SUM-3)(NS)
103	3-701-630-00	BAG, POLYETHYLENE
104	.....	
105	3-783-976-11	MANUAL, INSTRUCTION
106	3-795-424-11	CARD, CONTROL
107	4-858-078-00	SHEET, PROTECTION
108	4-881-738-00	CUSHION, UPPER
109	4-881-739-00	CUSHION, LOWER
110	4-881-905-00	INDIVIDUAL CARTON
111	X-4881-901-0	LABEL ASSY (EP), STATION

ELECTRICAL PARTS

Ref.No.	Part No.	Description			
501	♦;1-508-994-00	PIN, CONNECTOR			
502	⚠.1-534-817-XX	CORD, POWER, EULO PLUG			
503	♦;1-535-115-00	TERMINAL			
504	♦;1-535-116-00	TERMINAL			
505	♦;1-535-120-00	TERMINAL			
506	♦;1-535-137-00	BASE POST 14MM (10MM PITCH)			
507	♦;1-560-060-00	PIN, CONNECTOR 2P			
508	♦;1-560-282-00	CONNECTOR PIN 7P			
509	♦;1-561-439-00	SOCKET, CONNECTOR 3P			
510	♦;1-561-442-00	SOCKET, CONNECTOR 6P			
511	♦;1-561-443-00	SOCKET, CONNECTOR 7P			
512	♦;1-607-493-00	PC BOARD, VOLUME			
513	♦;1-607-494-00	PC BOARD, BREAKER			
514	♦;1-607-495-00	PC BOARD, SPEAKER SW			
515	♦;1-607-496-00	PC BOARD, HEADPHONE			
516	♦;1-607-497-00	PC BOARD, SPEAKER TERMINAL			
517	♦;1-607-498-00	PC BOARD, LED			
518	♦;1-607-499-00	PC BOARD, IC			
519	♦;A-4409-635-A	MOUNTED PCB, MAIN			
520	♦;A-4472-098-A	MOUNTED PCB, DISPLAY			
521	1-533-131-11	HOLDER, FUSE			
522	♦;1-535-416-00	TERMINAL			
523	1-560-039-00	PIN, CONNECTOR			
524	1-560-061-00	PIN, CONNECTOR 3P			
525	1-561-919-00	SOCKET, CONNECTOR			
526	1-608-121-00	PC BOARD, OUTLET			
C601	1-161-318-00	CERAMIC	390PF	10%	50V
C651	1-161-318-00	CERAMIC	390PF	10%	50V
C717	1-123-511-00	ELECT	33MF	20%	50V
C805	⚠.1-124-030-00	ELECT	6800MF	20%	42V
C806	⚠.1-123-513-00	ELECT	100MF	20%	50V
C807	⚠.1-124-030-00	ELECT	6800MF	20%	42V
C809	⚠.1-108-389-00	PE TEREPHTHALATE	0.1MF	10%	100V
C810	⚠.1-108-389-00	PE TEREPHTHALATE	0.1MF	10%	100V
C811	⚠.1-108-389-00	PE TEREPHTHALATE	0.1MF	10%	100V
C812	⚠.1-108-389-00	PE TEREPHTHALATE	0.1MF	10%	100V
C901	⚠.1-161-744-00	CERAMIC	10000PF		400V
CB902	⚠.1-532-541-00	BREAKER, CIRCUIT			
CF201	1-527-344-91	FILTER, CERAMIC			
CF203	1-527-344-91	FILTER, CERAMIC			
CF401	1-527-599-00	FILTER, MECHANICAL			
CNJ901	⚠1-526-694-00	OUTLET, AC			
CNJ902	⚠1-526-694-00	OUTLET, AC			
CNJ903	1-507-669-00	JACK			
CP803	⚠1-102-394-00	CERAMIC	(0.01MF+0.01MF)		250V

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CAPACITORS:
- All capacitors are in μF. Common capacitors are omitted. Refer to the following lists for their part numbers. MF:μF, PF:μμF.

RESISTORS
- All resistors are in ohms. Common 1/4W, 1/8W and 1/16W carbon resistors are omitted. Refer to the following lists for their part numbers.
- F : nonflammable

COILS
- MMH : mH, UH : μH

The components identified by shading and mark ⚠ are critical for safety. Replace only with part number specified.

SEMICONDUCTORS
In each case, U : μ, for example:
UA···: μA···, UPA···: μPA···, UPC···: μPC, UPD···: μPD···

ELECTRICAL PARTS

Ref.No.	Part No.	Description
CT401	1-141-180-00	CAP, TRIMMER
CT402	1-141-180-00	CAP, TRIMMER
CT403	1-141-181-11	CAP, TRIMMER
CT404	1-141-181-11	CAP, TRIMMER
D201	8-719-815-55	DIODE 1S1555
D301	8-719-815-55	DIODE 1S1555
D302	8-719-931-25	DIODE EQB01-25
D304	8-719-815-55	DIODE 1S1555
D305	8-719-912-00	DIODE MV-12N
D306	8-719-815-55	DIODE 1S1555
D307	8-719-815-55	DIODE 1S1555
D308	8-719-815-55	DIODE 1S1555
D309	8-719-815-55	DIODE 1S1555
D310	8-719-815-55	DIODE 1S1555
D312	8-719-815-55	DIODE 1S1555
D313	8-719-815-55	DIODE 1S1555
D314	8-719-815-55	DIODE 1S1555
D316	8-719-909-18	DIODE GL-9PR9
D401	8-719-912-27	DIODE KV1226
D402	8-719-912-27	DIODE KV1226
D403	8-719-815-55	DIODE 1S1555
D404	8-719-912-00	DIODE MV-12N
D405	8-719-912-00	DIODE MV-12N
D406	8-719-815-55	DIODE 1S1555
D501	8-719-815-55	DIODE 1S1555
D703	8-719-200-02	DIODE 10E-2
D801	8-719-931-28	DIODE EQB01-28
D802	8-719-100-43	DIODE RD7.5E-B1
D803	8-719-931-16	DIODE EQB01-16
D804	8-719-931-16	DIODE EQB01-16
D805	8-719-931-21	DIODE EQB01-21
D806 ⚠	8-719-200-02	DIODE 10E-2
D807 ⚠	8-719-200-02	DIODE 10E-2
D808 ⚠	8-719-504-40	DIODE S4VB40
D809	8-719-200-02	DIODE 10E-2
D902	8-719-909-19	DIODE GL-9NG9
F901 ⚠	1-532-285-11	FUSE, TIME-LAG
FE201	A-4344-029-A	FRONT END
FIP301	1-519-256-00	INDICATOR TUBE, FLUORESCENT
IC201	8-759-812-35	IC LA1235
IC202	8-759-833-90	IC LA3390
IC301	8-759-200-66	IC TCP4621BP-6502
IC302	8-759-617-78	IC CX-778A
IC401	8-759-812-45	IC LA1245
IC501	8-759-600-02	IC M5218L

ELECTRICAL PARTS

Ref.No.	Part No.	Description
IC502	8-759-307-70	IC CX-770A
IC601	8-759-600-02	IC M5218L
IC701	8-749-930-41	IC STK-3041
IC702	8-749-921-29	IC STK-2129
J501	1-507-788-00	JACK, PIN 4P
J502	1-507-788-00	JACK, PIN 4P
J503	1-507-788-00	JACK, PIN 4P
J504	1-507-788-00	JACK, PIN 4P
J551	1-507-788-00	JACK, PIN 4P
J552	1-507-788-00	JACK, PIN 4P
J553	1-507-788-00	JACK, PIN 4P
J554	1-507-788-00	JACK, PIN 4P
L301	1-408-183-00	MICRO INDUCTOR 10UH
L302	1-408-183-00	MICRO INDUCTOR 10UH
L402	1-408-199-00	MICRO INDUCTOR 220UH
L701 ♦	1-420-872-00	COIL, AIRE CORE
L751 ♦	1-420-872-00	COIL, AIRE CORE
L801	1-408-183-00	MICRO INDUCTOR 10UH
L901	1-401-929-21	ANTENNA, FERRITE-ROD (LW/MW)
PT901 ⚠	1-447-301-00	TRANSFORMER, POWER
Q201	8-729-671-14	TRANSISTOR 2SC710-14
Q202	8-729-671-14	TRANSISTOR 2SC710-14
Q205	8-729-245-83	TRANSISTOR 2SC2458
Q206	8-729-245-83	TRANSISTOR 2SC2458
Q207	8-729-245-83	TRANSISTOR 2SC2458
Q301	8-729-245-83	TRANSISTOR 2SC2458
Q302	8-729-204-82	TRANSISTOR 2SA1048
Q303	8-729-204-82	TRANSISTOR 2SA1048
Q304	8-729-204-82	TRANSISTOR 2SA1048
Q305	8-729-245-83	TRANSISTOR 2SC2458
Q306	8-729-203-05	TRANSISTOR 2SK30A-GR3
Q307	8-729-665-47	TRANSISTOR 2SC1362
Q401	8-729-245-83	TRANSISTOR 2SC2458
Q402	8-729-245-83	TRANSISTOR 2SC2458
Q403	8-729-204-82	TRANSISTOR 2SA1048
Q404	8-729-245-83	TRANSISTOR 2SC2458
Q405	8-729-245-83	TRANSISTOR 2SC2458
Q406	8-729-204-82	TRANSISTOR 2SA1048
Q407	8-729-245-83	TRANSISTOR 2SC2458
Q408	8-729-245-83	TRANSISTOR 2SC2458
Q409	8-729-203-05	TRANSISTOR 2SK30A-GR3
Q501	8-729-245-83	TRANSISTOR 2SC2458
Q502	8-729-204-82	TRANSISTOR 2SA1048
Q503	8-729-245-83	TRANSISTOR 2SC2458

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CAPACITORS:
- All capacitors are in μF. Common capacitors are omitted. Refer to the following lists for their part numbers. MF:μF, PF:μμF.

RESISTORS
- All resistors are in ohms. Common 1/4W, 1/8W and 1/16W carbon resistors are omitted. Refer to the following lists for their part numbers.
- F : nonflammable

COILS
- MMH : mH, UH : μH

The components identified by shading and mark ⚠ are critical for safety. Replace only with part number specified.

SEMICONDUCTORS
In each case, U : μ, for example:
UA···: μA···, UPA···: μPA···, UPC···: μPC, UPD···: μPD···

TR-VX20L

ELECTRICAL PARTS

Ref.No.	Part No.	Description				
Q504	8-729-204-82	TRANSISTOR 2SA1048				
Q505	8-729-245-83	TRANSISTOR 2SC2458				
Q506	8-729-204-82	TRANSISTOR 2SA1048				
Q701	8-729-204-82	TRANSISTOR 2SA1048				
Q702	8-729-245-83	TRANSISTOR 2SC2458				
Q708	8-729-204-82	TRANSISTOR 2SA1048				
Q709	8-729-204-82	TRANSISTOR 2SA1048				
Q752	8-729-245-83	TRANSISTOR 2SC2458				
Q801	8-729-245-83	TRANSISTOR 2SC2458				
Q802	8-729-245-83	TRANSISTOR 2SC2458				
Q803	8-729-288-02	TRANSISTOR 2SD880				
Q804	8-729-204-82	TRANSISTOR 2SA1048				
Q805	8-729-374-02	TRANSISTOR 2SB740				
Q806	8-729-224-61	TRANSISTOR 2SK246				
R201	1-244-945-00	CARBON	1M	5%	1/2W	
R212 ⚠	1-247-109-00	CARBON	120	5%	1/4W	F
R220 ⚠	1-247-109-00	CARBON	120	5%	1/4W	F
R241 ⚠	1-247-109-00	CARBON	120	5%	1/4W	F
R301	1-244-857-00	CARBON	220	5%	1/2W	
R307 ⚠	1-213-138-00	METAL	390	5%	1W	F
R419 ⚠	1-247-109-00	CARBON	120	5%	1/4W	F
R424 ⚠	1-247-115-00	CARBON	220	5%	1/4W	F
R533	1-214-951-00	METAL	3.9M	1%	1/2W	
R705 ⚠	1-247-107-00	CARBON	100	5%	1/4W	F
R707 ⚠	1-247-115-00	CARBON	220	5%	1/4W	F
R709	1-244-817-00	CARBON	4.7	5%	1/2W	
R712 ⚠	1-247-101-00	CARBON	56	5%	1/4W	F
R728 ⚠	1-247-228-00	CARBON	330	5%	1/2W	F
R731 ⚠	1-247-091-00	CARBON	22	5%	1/4W	F
R755 ⚠	1-247-107-00	CARBON	100	5%	1/4W	F
R757 ⚠	1-247-115-00	CARBON	220	5%	1/4W	F
R759	1-244-817-00	CARBON	4.7	5%	1/2W	
R778 ⚠	1-247-228-00	CARBON	330	5%	1/2W	F
R803 ⚠	1-246-481-00	CARBON	2.2K	5%	1/4W	
R801 ⚠	1-247-222-00	CARBON	180	5%	1/2W	F
R805 ⚠	1-206-472-00	METAL	24	5%	2W	F
R808 ⚠	1-213-143-00	METAL	1K	5%	1W	F
R810 ⚠	1-212-987-00	FUSIBLE	160	5%	1/2W	F
R811 ⚠	1-212-966-00	FUSIBLE	22	5%	1/2W	F
R812 ⚠	1-206-672-00	METAL	2.2K	5%	2W	F
R813 ⚠	1-247-079-00	CARBON	4.7	5%	1/4W	F
R814 ⚠	1-247-079-00	CARBON	4.7	5%	1/4W	F

ELECTRICAL PARTS

Ref.No.	Part No.	Description
RT201	1-226-235-00	RES, ADJ, CARBON 5K
RT202	1-226-236-00	RES, ADJ, CARBON 10K
RT203	1-226-238-00	RES, ADJ, CARBON 50K
RV601	1-228-613-00	RES, VAR, SLIDE 100K
RV602	1-228-610-00	RES, VAR, CARBON 250K
RV603	1-228-611-00	RES, VAR, CARBON 20K/20K
RV604	1-228-611-00	RES, VAR, CARBON 20K/20K
RV651	1-228-613-00	RES, VAR, SLIDE 100K
RV653	1-228-611-00	RES, VAR, CARBON 20K/20K
RV654	1-228-611-00	RES, VAR, CARBON 20K/20K
S5	1-554-119-00	SWITCH, PUSH (1 KEY)
S6	1-553-884-00	SWITCH, PUCH (1 KEY)
S7	1-553-761-00	SWITCH, PUSH (2 KEY)
S301	1-552-412-00	SWITCH, KEY BOARD
S302	1-552-412-00	SWITCH, KEY BOARD
S303	1-552-412-00	SWITCH, KEY BOARD
S304	1-552-412-00	SWITCH, KEY BOARD
S305	1-552-412-00	SWITCH, KEY BOARD
S306	1-552-412-00	SWITCH, KEY BOARD
S307	1-552-412-00	SWITCH, KEY BOARD
S308	1-552-412-00	SWITCH, KEY BOARD
S309	1-552-412-00	SWITCH, KEY BOARD
S310	1-552-412-00	SWITCH, KEY BOARD
S311	1-552-412-00	SWITCH, KEY BOARD
S312	1-552-412-00	SWITCH, KEY BOARD
S313	1-552-412-00	SWITCH, KEY BOARD
S314	1-552-412-00	SWITCH, KEY BOARD
S315	1-552-412-00	SWITCH, KEY BOARD
S316	1-552-412-00	SWITCH, KEY BOARD
S318	1-552-412-00	SWITCH, KEY BOARD
S901 ⚠	1-553-447-00	SWITCH, PUSH (AC POWER)
T201	1-404-338-00	TRANSFORMER, DISCRIMINATOR (FM)
T202	1-404-339-00	TRANSFORMER, DISCRIMINATOR
T401	1-405-927-00	COIL, MW OSC
T402	1-405-914-00	COIL, LW OSC
T403	1-409-348-00	COIL, MECHANICAL FILTER
TM901	1-536-708-00	TERMINAL BOARD, PUSH 4P
TM903	1-536-706-00	TERMINAL BOARD (SP)
XT301	1-527-731-00	OSCILLATOR, CRYSTAL

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- All resistors are in ohms. Common 1/4W, 1/8W and 1/16W carbon resistors are omitted. Refer to the following lists for their part numbers.
- F : nonflammable

COILS
- MMH : mH, UH : μH

The components identified by shading and mark ⚠ are critical for safety. Replace only with part number specified.

SEMICONDUCTORS
In each case, U : μ, for example:
UA···: μA···, UPA···: μPA···, UPC···: μPC, UPD···: μPD···

ELECTROLYTIC CAPACITORS

CAP. (μF)	RATING → : Use the high voltage rated one.					
	6.3 VOLT.	10 VOLT.	16 VOLT.	25 VOLT.	35 VOLT.	50 VOLT.
	PART No.	PART No.	PART No.	PART No.	PART No.	PART No.
0.47					→	1-121-726-00
1.0					→	1-121-391-00
2.2					→	1-121-450-00
3.3	→	→	→	1-121-392-00	→	1-121-393-00
4.7	→	→	→	1-121-395-00	→	1-121-396-00
10	→	→	1-121-651-00	1-121-398-00	→	1-121-738-00
22	→	→	1-121-479-00	1-121-480-00	1-121-662-00	1-121-152-00
33	→	→	1-121-403-00	1-121-404-00	1-121-652-00	1-121-405-00
47	→	1-121-352-00	1-121-409-00	1-121-410-00	1-121-653-00	1-121-411-00
100	→	1-121-414-00	1-121-415-00	1-121-416-00	1-121-357-00	1-121-417-00
220	1-121-419-00	1-121-420-00	1-121-421-00	1-121-422-00	1-121-261-00	1-121-423-00
330	1-121-751-00	1-121-805-00	1-121-521-00	1-121-654-00	1-121-655-00	1-121-656-00
470	1-121-424-00	1-121-425-00	1-121-426-00	1-121-733-00	1-121-361-00	1-121-810-00
1000	–	1-121-736-00	1-121-245-00	1-121-657-00	1-121-388-00	1-123-061-00
2200	1-121-658-00	1-121-659-00	1-121-660-00	1-123-067-00	1-121-984-00	–
3300	1-121-661-00	1-123-075-00	1-123-071-00	–	–	–

CAP. (μF)	100 VOLT.	160 VOLT.	250 VOLT.	350 VOLT.
	PART No.	PART No.	PART No.	PART No.
0.47	–	–	–	–
1.0	1-123-249-00	1-123-252-00	1-123-003-00	1-121-168-00
2.2	1-123-250-00	1-123-026-00	–	1-123-028-00
3.3	1-121-995-00	–	1-123-004-00	1-123-006-00
4.7	1-123-255-00	1-121-246-00	1-121-759-00	1-123-007-00
10	1-121-126-00	1-121-999-00	1-123-254-00	1-123-008-00
22	1-121-996-00	1-123-253-00	1-123-005-00	1-123-022-00
33	1-121-997-00	1-121-757-00	–	–
47	1-123-251-00	1-121-919-00	–	–
100	1-123-084-00	–	–	–

CERAMIC CAPACITORS

CAP. (pF)	RATING							
	50 VOLT.	CAP. (pF)	50 VOLT.	CAP. (pF)	50 VOLT.	CAP. (μF)	50 VOLT.
	PART No.		PART No.		PART No.		PART No.
0.5	1-101-837-00	22	1-102-959-00	150	1-101-361-00	0.001	1-102-074-00
0.75	1-101-586-00	24	1-102-960-00	160	1-101-367-00	0.0012	1-102-118-00
1.0	1-102-934-00	27	1-102-961-00	180	1-102-976-00	0.0015	1-102-119-00
1.5	1-101-576-00	30	1-102-962-00	200	1-102-977-00	0.0018	1-102-120-00
2.0	1-102-935-00	33	1-102-963-00	220	1-102-978-00	0.0022	1-102-121-00
3	1-102-936-00	36	1-102-964-00	240	1-102-979-00	0.0027	1-102-122-00
4	1-102-937-00	39	1-102-965-00	270	1-102-980-00	0.0033	1-102-123-00
5	1-102-942-00	43	1-102-966-00	300	1-102-981-00	0.0039	1-102-124-00
6	1-102-943-00	47	1-101-880-00	330	1-102-820-00	0.0047	1-102-125-00
7	1-102-944-00	51	1-101-882-00	360	1-102-821-00	0.0056	1-102-126-00
8	1-102-945-00	56	1-101-884-00	390	1-102-822-00	0.0068	1-102-127-00
9	1-102-946-00	62	1-101-886-00	430	1-102-823-00	0.0082	1-102-128-00
10	1-102-947-00	68	1-101-888-00	470	1-102-824-00	0.01	1-102-129-00
11	1-102-948-00	75	1-101-890-00	510	1-101-059-00	0.022	1-101-005-00
12	1-102-949-00	82	1-102-971-00	560	1-102-115-00	0.047	1-101-006-00
13	1-102-950-00	91	1-102-972-00	680	1-102-116-00		
15	1-102-951-00	100	1-102-973-00	820	1-102-117-00		
16	1-102-952-00	110	1-102-815-00				
18	1-102-953-00	120	1-102-816-00				
20	1-102-958-00	130	1-101-081-00				

0.001μF = 1,000pF

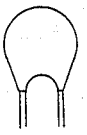
CERAMIC (SEMICONDUCTOR) CAPACITORS

CAP. (μF)	RATING → : Use the high voltage rated one.				
	25 VOLT.	50 VOLT.	CAP. (μF)	25 VOLT.	50 VOLT.
	PART No.	PART No.		PART No.	PART No.
0.001	→	1-161-039-00	0.018	1-161-016-00	1-161-054-00
0.0012	→	1-161-040-00	0.022	1-161-017-00	1-161-055-00
0.0015		1-161-041-00	0.027	1-161-018-00	1-161-056-00
0.0018		1-161-042-00	0.033	1-161-019-00	1-161-057-00
0.0022		1-161-043-00	0.039	1-161-010-00	1-161-058-00
0.0027	→	1-161-044-00	0.047	1-161-021-00	1-161-059-00
0.0033	→	1-161-045-00	0.056	→	1-161-060-00
0.0039	→	1-161-046-00	0.068	→	1-161-061-00
0.0047	→	1-161-047-00	0.082	1-161-024-00	1-161-062-00
0.0056	→	1-161-048-00	0.1	1-161-025-00	1-161-063-00
0.0068	→	1-161-049-00			
0.0082	1-161-012-00	1-161-050-00			
0.01	1-161-013-00	1-161-051-00			
0.012	→	1-161-052-00			
0.015	1-161-015-00	1-161-053-00			

MYLAR CAPACITORS

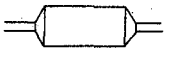
CAP. (μF)	RATING 50 VOLT. PART No.	100 VOLT. PART No.	200 VOLT. PART No.	CAP. (μF)	50 VOLT. PART No.	100 VOLT. PART No.	200 VOLT. PART No.	CAP. (μF)	50 VOLT. PART No.	100 VOLT. PART No.	200 VOLT. PART No.
0.001	1-108-227-00	1-108-365-00	1-108-409-00	0.01	1-108-239-00	1-108-377-00	1-108-421-00	0.1	1-108-251-00	1-108-389-00	1-108-433-00
0.0012	1-108-351-00	1-108-366-00	1-108-410-00	0.012	1-108-357-00	1-108-378-00	1-108-422-00	0.12	1-108-363-00	1-108-390-00	1-108-434-00
0.0015	1-108-228-00	1-108-367-00	1-108-411-00	0.015	1-108-240-00	1-108-379-00	1-108-423-00	0.15	1-108-252-00	1-108-391-00	1-108-435-00
0.0018	1-108-352-00	1-108-368-00	1-108-412-00	0.018	1-108-358-00	1-108-380-00	1-108-424-00	0.18	1-108-364-00	1-108-392-00	1-108-436-00
0.0022	1-108-230-00	1-108-369-00	1-108-413-00	0.022	1-108-242-00	1-108-381-00	1-108-425-00	0.22	1-108-254-00	1-108-393-00	1-108-437-00
0.0027	1-108-353-00	1-108-370-00	1-108-414-00	0.027	1-108-359-00	1-108-382-00	1-108-426-00	0.27	1-108-854-00	–	–
0.0033	1-108-232-00	1-108-371-00	1-108-415-00	0.033	1-108-244-00	1-108-383-00	1-108-427-00	0.33	1-108-855-00	–	–
0.0039	1-108-354-00	1-108-372-00	1-108-416-00	0.039	1-108-360-00	1-108-384-00	1-108-428-00	0.39	1-108-856-00	–	–
0.0047	1-108-234-00	1-108-373-00	1-108-417-00	0.047	1-108-246-00	1-108-385-00	1-108-429-00	0.47	1-108-857-00	–	–
0.0056	1-108-355-00	1-108-374-00	1-108-418-00	0.056	1-108-361-00	1-108-386-00	1-108-430-00				
0.0068	1-108-237-00	1-108-375-00	1-108-419-00	0.068	1-108-249-00	1-108-387-00	1-108-431-00				
0.0082	1-108-356-00	1-108-376-00	1-108-420-00	0.082	1-108-362-00	1-108-388-00	1-108-432-00				

TANTALUM CAPACITORS



CAP. (μF)	RATING 3.15 VOLT. PART No.	6.3 VOLT. PART No.	10 VOLT. PART No.	16 VOLT. PART No.	20 VOLT. PART No.	25 VOLT. PART No.	35 VOLT. PART No.
	→: Use the high voltage rated one.						
0.01					→	→	1-131-396-00
0.015						→	1-131-397-00
0.022						→	1-131-398-00
0.033						→	1-131-399-00
0.047						→	1-131-400-00
0.068					→	→	1-131-401-00
0.1					→	→	1-131-402-00
0.15					→	→	1-131-403-00
0.22					→	→	1-131-404-00
0.33					→	1-131-409-00	1-131-405-00
0.47	–	–	–	–	1-131-412-00	→	1-131-406-00
0.68	–	–	–	1-131-415-00	→	1-131-410-00	1-131-407-00
1.0	–	–	1-131-418-00	–	1-131-413-00	→	1-131-408-00
1.5	–	1-131-421-00	–	1-131-416-00	→	1-131-411-00	1-131-348-00
2.2	1-131-424-00	–	1-131-419-00	–	1-131-414-00	1-131-355-00	1-131-349-00
3.3	–	1-131-422-00	–	1-131-417-00	1-131-362-00	1-131-356-00	1-131-350-00
4.7	1-131-425-00	–	1-131-420-00	1-131-369-00	1-131-363-00	1-131-357-00	1-131-351-00
6.8	–	1-131-423-00	1-131-376-00	1-131-370-00	1-131-364-00	1-131-358-00	1-131-352-00
10	1-131-426-00	1-131-383-00	1-131-377-00	1-131-371-00	1-131-365-00	1-131-359-00	1-131-353-00
15	1-131-390-00	1-131-384-00	1-131-378-00	1-131-372-00	1-131-366-00	1-131-360-00	–
22	1-131-391-00	1-131-385-00	1-131-379-00	1-131-373-00	1-131-367-00		
33	1-131-392-00	1-131-386-00	1-131-380-00	1-131-374-00			
47	1-131-393-00	1-131-387-00	1-131-381-00	–			
68	1-131-394-00	1-131-388-00	–	–			
100	1-131-395-00	–	–	–			

TANTALUM CAPACITORS



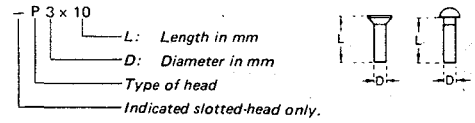
CAP. (μF)	RATING 3 VOLT. PART No.	6.3 VOLT. PART No.	10 VOLT. PART No.	16 VOLT. PART No.	20 VOLT. PART No.	35 VOLT. PART No.
0.033						1-131-273-00
0.047						1-131-274-00
0.068						1-131-275-00
0.1						1-131-276-00
0.15						1-131-277-00
0.22			–	–	1-131-262-00	1-131-278-00
0.33			–	–	1-131-263-00	1-131-279-00
0.47			1-131-169-00	–	1-131-264-00	1-131-280-00
0.68			–	1-131-258-00	1-131-265-00	1-131-281-00
1.0			1-131-254-00	–	1-131-266-00	1-131-282-00
1.5		1-131-250-00	–	–	1-131-267-00	1-131-283-00
2.2		–	–	1-131-259-00	1-131-268-00	1-131-284-00
3.3		–	1-131-255-00	–	1-131-269-00	–
4.7		1-131-251-00	1-131-171-00	–	1-131-270-00	–
6.8		–	–	1-131-260-00	1-131-271-00	–
10	–	–	1-131-256-00	–	1-131-272-00	–
15	–	1-131-252-00	–	1-131-261-00		
22	–	–	1-131-257-00	–		
33	1-131-176-00	1-131-253-00	1-131-173-00	–		
47	1-131-288-00	1-131-174-00	–	–		
100	1-131-177-00					

1/4 WATT CARBON RESISTORS

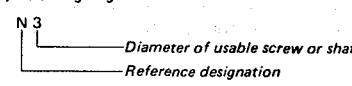
Ω	Part No.	Ω	Part No.	Ω	Part No.	Ω	Part No.	Ω	Part No.	Ω	Part No.	Ω	Part No.
1.0	1-246-401-00	10	1-246-425-00	100	1-246-449-00	1.0k	1-246-473-00	10k	1-246-497-00	100k	1-246-521-00	1.0M	1-246-545-00
1.1	1-246-402-00	11	1-246-426-00	110	1-246-450-00	1.1k	1-246-474-00	11k	1-246-498-00	110k	1-246-522-00	1.1M	1-210-814-00
1.2	1-246-403-00	12	1-246-427-00	120	1-246-451-00	1.2k	1-246-475-00	12k	1-246-499-00	120k	1-246-523-00	1.2M	1-210-815-00
1.3	1-246-404-00	13	1-246-428-00	130	1-246-452-00	1.3k	1-246-476-00	13k	1-246-500-00	130k	1-246-524-00	1.3M	1-210-816-00
1.5	1-246-405-00	15	1-246-429-00	150	1-246-453-00	1.5k	1-246-477-00	15k	1-246-501-00	150k	1-246-525-00	1.5M	1-210-817-00
1.6	1-246-406-00	16	1-246-430-00	160	1-246-454-00	1.6k	1-246-478-00	16k	1-246-502-00	160k	1-246-526-00	1.6M	1-210-818-00
1.8	1-246-407-00	18	1-246-431-00	180	1-246-455-00	1.8k	1-246-479-00	18k	1-246-503-00	180k	1-246-527-00	1.8M	1-210-819-00
2.0	1-246-408-00	20	1-246-432-00	200	1-246-456-00	2.0k	1-246-480-00	20k	1-246-504-00	200k	1-246-528-00	2.0M	1-210-820-00
2.2	1-246-409-00	22	1-246-433-00	220	1-246-457-00	2.2k	1-246-481-00	22k	1-246-505-00	220k	1-246-529-00	2.2M	1-210-821-00
2.4	1-246-410-00	24	1-246-434-00	240	1-246-458-00	2.4k	1-246-482-00	24k	1-246-506-00	240k	1-246-530-00	2.4M	1-244-754-00
2.7	1-246-411-00	27	1-246-435-00	270	1-246-459-00	2.7k	1-246-483-00	27k	1-246-507-00	270k	1-246-531-00	2.7M	1-244-755-00
3.0	1-246-412-00	30	1-246-436-00	300	1-246-460-00	3.0k	1-246-484-00	30k	1-246-508-00	300k	1-246-532-00	3.0M	1-244-756-00
3.3	1-246-413-00	33	1-246-437-00	330	1-246-461-00	3.3k	1-246-485-00	33k	1-246-509-00	330k	1-246-533-00	3.3M	1-244-757-00
3.6	1-246-414-00	36	1-246-438-00	360	1-246-462-00	3.6k	1-246-486-00	36k	1-246-510-00	360k	1-246-534-00	3.6M	1-244-758-00
3.9	1-246-415-00	39	1-246-439-00	390	1-246-463-00	3.9k	1-246-487-00	39k	1-246-511-00	390k	1-246-535-00	3.9M	1-244-759-00
4.3	1-246-416-00	43	1-246-440-00	430	1-246-464-00	4.3k	1-246-488-00	43k	1-246-512-00	430k	1-246-536-00	4.3M	1-244-760-00
4.7	1-246-417-00	47	1-246-441-00	470	1-246-465-00	4.7k	1-246-489-00	47k	1-246-513-00	470k	1-246-537-00	4.7M	1-244-761-00
5.1	1-246-418-00	51	1-246-442-00	510	1-246-466-00	5.1k	1-246-490-00	51k	1-246-514-00	510k	1-246-538-00	5.1M	1-244-762-00
5.6	1-246-419-00	56	1-246-443-00	560	1-246-467-00	5.6k	1-246-491-00	56k	1-246-515-00	560k	1-246-539-00		
6.2	1-246-420-00	62	1-246-444-00	620	1-246-468-00	6.2k	1-246-492-00	62k	1-246-516-00	620k	1-246-540-00		
6.8	1-246-421-00	68	1-246-445-00	680	1-246-469-00	6.8k	1-246-493-00	68k	1-246-517-00	680k	1-246-541-00		
7.5	1-246-422-00	75	1-246-446-00	750	1-246-470-00	7.5k	1-246-494-00	75k	1-246-518-00	750k	1-246-542-00		
8.2	1-246-423-00	82	1-246-447-00	820	1-246-471-00	8.2k	1-246-495-00	82k	1-246-519-00	820k	1-246-543-00		
9.1	1-246-424-00	91	1-246-448-00	910	1-246-472-00	9.1k	1-246-496-00	91k	1-246-520-00	910k	1-246-544-00		

HARDWARE NOMENCLATURE

Screw:



Nut, Washer, Retaining ring:



Reference Designation	Shape	Description	Remarks
SCREWS			
P		pan-head screw	binding-head (B) screw for replacement
PWH		pan-head screw with washer face	binding-head (B) screw and flat washer for replacement
PS PSP		pan-head screw with spring washer	binding-head (B) screw and spring washer for replacement
PSW PSPW		pan-head screw with *spring and flat washers*	binding-head (B) screw and *spring and flat washers* for replacement
R		round-head screw	binding-head (B) screw for replacement
K		flat-countersunk-head screw	
RK		oval-countersunk-head screw	
B		binding-head screw	
T		truss-head screw	binding-head (B) screw for replacement
F		flat-fillister-head screw	
RF		fillister-head screw	
BV		brazier-head screw	

Reference Designation	Shape	Description	Remarks
SELF-TAPPING SCREWS			
TA		self-tapping screw	ex: TA, P 3 x 10
PTP		pan-head self-tapping screw	binding-head self-tapping (TA, B) screw for replacement
PTPWH		pan-head self-tapping screw with washer face	binding-head self tapping (TA, B) screw and flat washer for replacement
PTTWH		pan-head thread-rolling screw with washer face	binding-head (B) screw and flat washer for replacement
SET SCREWS			
SC		set screw	
SC		hexagon-socket set screw	ex: SC 2.6 x 4, hexagon socket
NUT			
N		nut	
WASHERS			
W		flat washer	
SW		spring washer	
LW		internal-tooth lock washer	ex: LW3, internal
LW		external-tooth lock washer	ex: LW3, external
RETAINING RINGS			
E		retaining ring	
G		grip-type retaining ring	

TROUBLE CHECKS

OFF-THE-AIR PROGRAMS

STEREO indicator does not light when receiving stereo programs.
- Adjust the antenna.
- Press the FM MODE switch.

STEREO indicator flickers.
- Adjust the antenna or connect an external FM antenna.
- Press the FM MODE switch to disengage the stereo mode.

The function/frequency display figures do not stop at the desired station during automatic tuning.
- The signal strength is too weak for automatic tuning.

Adjust the antenna for optimum reception or tune in the station with the direct access tuning system.

Tuning cannot be done correctly when the station preset button is pressed.
- Memorize the frequency correctly.
- Install or replace with new batteries for memory back-up.

Incorrect figure appear on the function/frequency display window.
- Install the batteries again. (page 10)

Severe hum or noise
- Use shielded connecting cords.
- Ground the receiver.
- Avoid long horizontal runs of antenna lead.
- Keep connecting cords (or antenna lead-in) away from transformers or motors, and at least 3 meters (10 feet) from TV sets and fluorescent lights.
- Adjust the antenna.
- Keep the speaker cords, connecting cords and power cords from the ferrite-bar antenna at the rear.

Ignition noise
- Install the outdoor antenna away from heavy traffic.
- Use a shielded or coaxial lead-in for the antenna.

Electrostatic charge.
- Ground the receiver.

GENERAL

No audio
- Check speaker and program source connections.
- Check the settings of the TAPE MONITOR switches.
- Check the SPEAKERS switches setting.
- Turn up the volume.
- Turn off the power and turn it on again.

No audio from one channel or unbalanced left and right volume
- Adjust the BALANCE control.
- Check the speaker and input connections of the inoperative channel.

Abrupt loss of sound from one or both of the speakers*
- Check the speaker terminals or speaker cord for a short.
- Remove any object on the top of the cabinet which might prevent normal air circulation.

Reversed left and right sound
- Check the speaker cord connection and speaker location.

Lack of bass sound or obscure instrument position
- Check the speaker connection for proper phasing.

Severe hum or noise
- Use shielded connecting cords.
- Keep the connecting cords away from transformers or motors and at least 3 meters (10 feet) from TV sets and fluorescent lights.
- Ground the receiver.

Rustling noise
- Make secure connections.
- Wipe the plugs and jacks with a cloth lightly dampened with methanol.

*This symptom may be caused when the protection circuits activate.

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English
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